SHEA

The Society for Healthcare Epidemiology of America

SAFE HEALTHCARE FOR ALL

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LEARNINGCE SHEA Online Education Center

The Rapid Response Podcasts

COVID-19 Updates: What We Know Now

Newest Episodes:

- To Mask or Not to Mask as Part of Standard Precautions?

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COVID-19 Real-Time Learning Network

Specialty Society Collaborators:

- American Academy of Family Physicians
- American Academy of Pediatrics
- American College of Emergency Physicians
- American College of Physicians
- American Geriatrics Society
- American Thoracic Society
- Pediatric Infectious Diseases Society
- Society for Critical Care Medicine
- Society for Healthcare Epidemiology of America
- Society of Hospital Medicine
- Society of Infectious Diseases Pharmacists

With funding from the Centers for Disease Control and Prevention, IDSA has launched the COVID-19 Real Time Learning Network, an online community that brings together information and opportunities for discussion on latest research, guidelines, tools and resources from a variety of medical subspecialties around the world.

www.COVID19LearningNetwork.org

@RealTimeCOVID19 | #RealTimeCOVID19

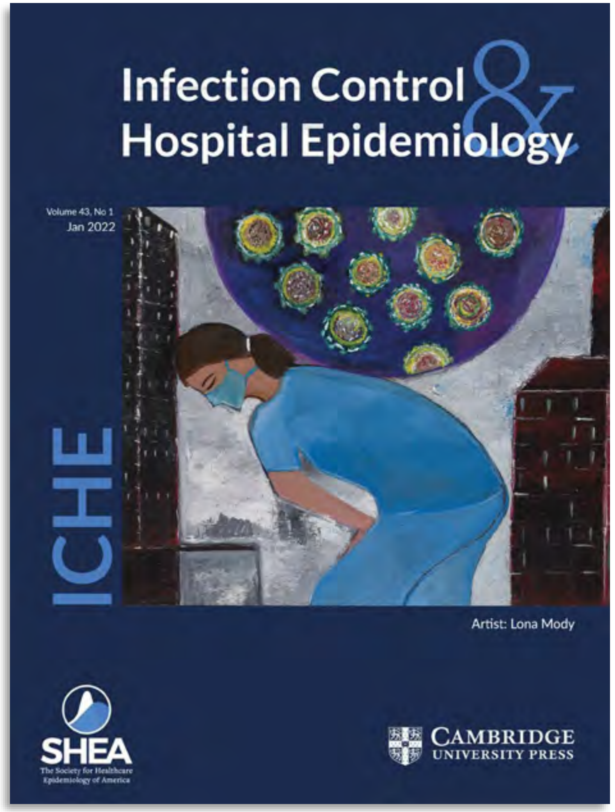
Prevention

An online learning module designed with frontline healthcare personnel in mind.

PreventionCHKC.org

SHEA

ICHE Journal – Fast Tracking COVID Article Submissions



Infection Control & Hospital Epidemiology publishes scientifically authoritative, clinically applicable, peer-reviewed research on control and evaluation of the transmission of pathogens in healthcare institutions and on the use of epidemiological principles and methods to evaluate and improve the delivery of care. Major topics covered include infection control practices, surveillance, antimicrobial stewardship, cost-benefit analyses, resource use, occupational health, and regulatory issues.

www.cambridge.org/iche

ASHE JOURNAL

High quality articles across the full spectrum of antimicrobial stewardship and healthcare epidemiology.

Exceptional author experience through constructive peer review, competitive turnaround times, immediate online publication, a streamlined production process, and social media promotion.

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SHEA Webinar

COVID-19 Town Hall Round 92

Music:
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House Keeping Items

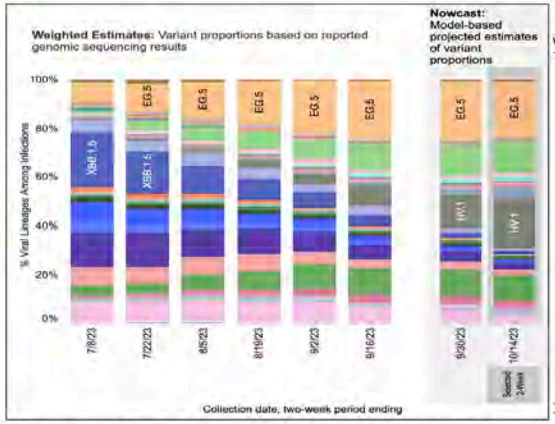
- Technical difficulties? Visit: https://support.zoom.us
- Webinar recording, PowerPoint presentation, and references available LearningCE' s Rapid Response Program
- Streaming Live on SHEA's Facebook page
- Zoom Q&A and Chat

SHEA Town Hall 92
Overview

SARS-CoV-2 Variants, US, CDC

Weighted and Nowcast Estimates in United States for 2-Week Periods in 6/25/2023 – 10/14/2023

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 10/1/2023 – 10/14/2023

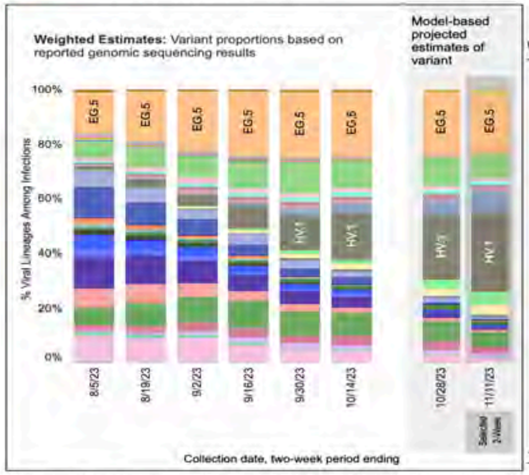
USA

WHO label	Lineage #	%Total	95%PI
Omicron	EG.5	23.6%	21.2-26.3%
	HV.1	19.5%	16.8-22.6%
	FL.1.5.1	13.5%	10.8-16.7%
	XBB.1.16.6	10.3%	9.1-11.8%
	HK.3	4.9%	3.6-6.7%
	XBB.2.3	4.1%	3.4-4.9%
	XBB.1.16.11	3.1%	2.5-3.9%
	XBB.1.16	2.8%	2.4-3.3%
	XBB.1.16.1	2.2%	1.7-2.7%
	XBB.1.16.15	1.8%	1.3-2.4%
	HF.1	1.7%	1.2-2.4%
	GK.1.1	1.6%	1.3-2.1%
	XBB	1.4%	1.2-1.7%
	GE.1	1.4%	1.0-1.9%
	XBB.1.5.70	1.2%	0.8-1.8%
	GK.2	0.9%	0.7-1.2%
	XBB.1.5	0.9%	0.7-1.0%
	EG.6.1	0.8%	0.6-1.2%
	XBB.1.9.1	0.8%	0.6-1.0%
	XBB.1.5.72	0.6%	0.4-0.8%
	XBB.1.5.68	0.5%	0.3-0.8%
	XBB.1.9.2	0.5%	0.4-0.7%
	XBB.1.42.2	0.5%	0.3-0.8%
	BA.2	0.3%	0.1-0.8%
	XBB.1.5.10	0.3%	0.2-0.4%
	CH.1.1	0.2%	0.1-0.3%
	XBB.2.3.8	0.2%	0.1-0.3%
	XBB.1.5.59	0.1%	0.1-0.2%
	FD.1.1	0.1%	0.1-0.1%
	FE.1.1	0.1%	0.0-0.1%
	XBB.1.5.1	0.0%	0.0-0.0%
	EU.1.1	0.0%	0.0-0.0%
	B.1.1.529	0.0%	0.0-0.0%
	BQ.1	0.0%	0.0-0.0%
	FD.2	0.0%	0.0-0.0%
Other	Other*	0.0%	0.0-0.1%

Data from 6/25 – 10/14 2023

Weighted and Nowcast Estimates in United States for 2-Week Periods in 7/23/2023 – 11/11/2023

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 10/29/2023 – 11/11/2023

USA

WHO label	Lineage #	%Total	95%PI
Omicron	HV.1	29.0%	26.0-32.1%
	EG.5	21.7%	19.3-24.2%
	FL.1.5.1	9.3%	8.0-10.8%
	HK.3	7.8%	6.2-9.9%
	XBB.1.16.6	5.6%	4.7-6.6%
	JD.1.1	4.6%	3.4-6.1%
	JF.1	3.5%	2.7-4.5%
	XBB.1.16.11	2.5%	2.0-3.2%
	XBB.2.3	1.9%	1.5-2.3%
	GK.1.1	1.6%	1.2-2.3%
	HF.1	1.4%	0.9-2.1%
	XBB.1.16.15	1.4%	1.0-1.9%
	XBB.1.16	1.2%	0.9-1.6%
	XBB.1.5.70	1.2%	0.6-2.2%
	BA.2	1.0%	0.5-2.1%
	GE.1	0.9%	0.6-1.3%
	XBB.1.16.1	0.8%	0.6-1.1%
	XBB	0.8%	0.6-1.0%
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	EG.6.1	0.5%	0.3-0.7%
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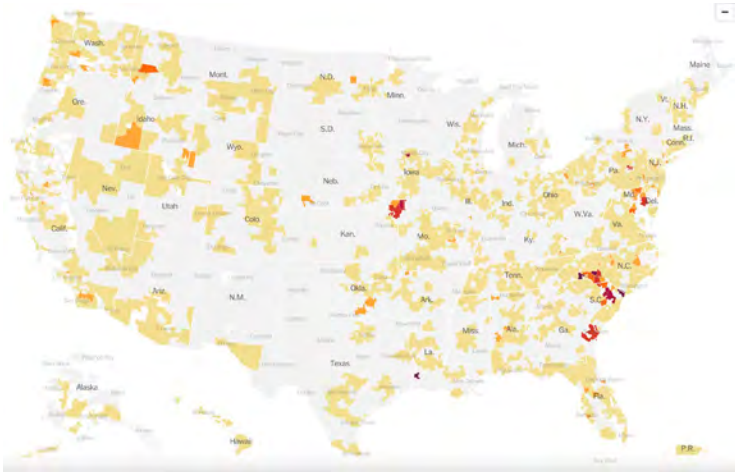
	XBB.1.5.1	0.0%	0.0-0.0%
	FE.1.1	0.0%	0.0-0.0%
	EU.1.1	0.0%	0.0-0.0%
Other	Other*	1.1%	0.6-2.0%

Data from 7/23 – 11/11 2023

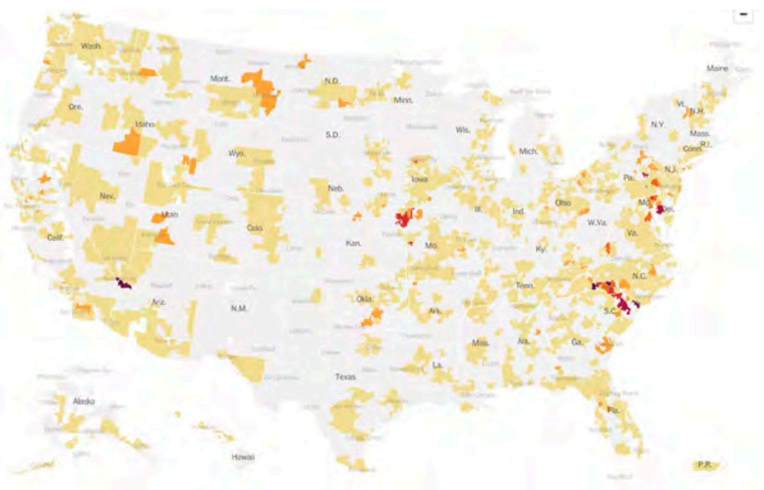
https://covid.cdc.gov/covid-data-tracker/#variant-proportions

US COVID-19 HOTSPOTS

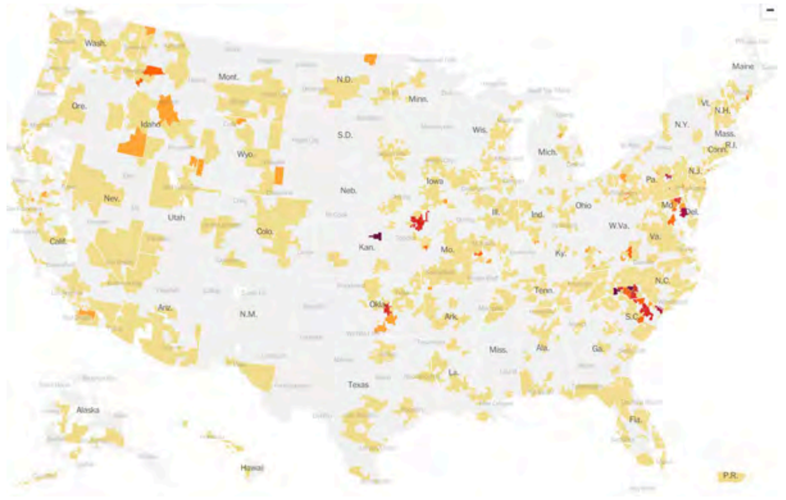
February 6, 2022



September 23, 2023



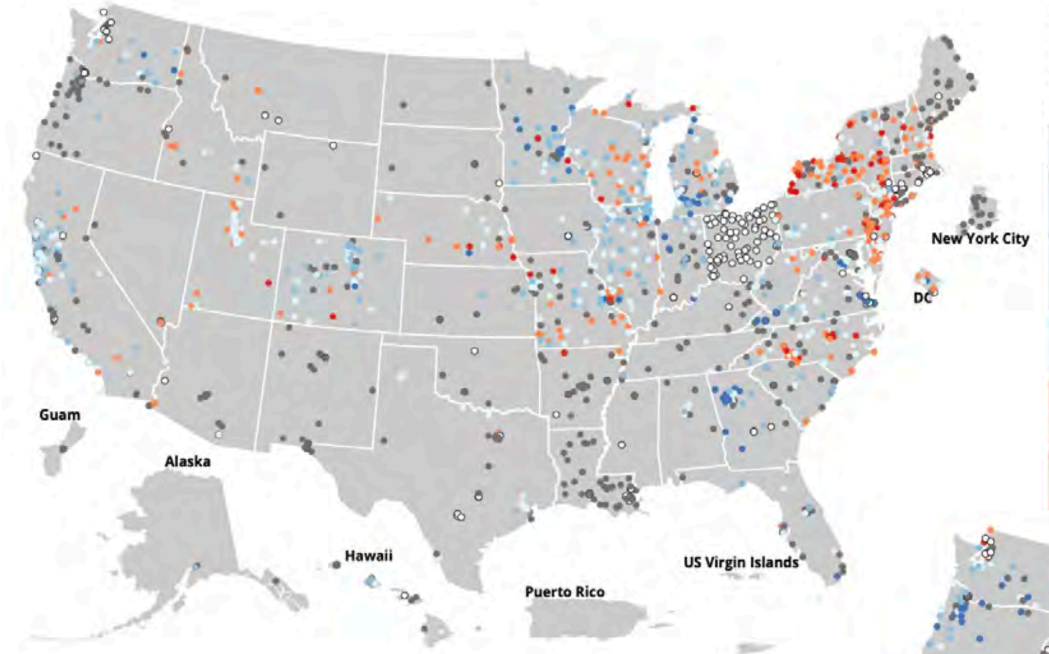
October 22, 2023



November 17, 2023

Source: New York Times https://www.nytimes.com/interactive/2023/us/covid-cases.html 11-17-2023

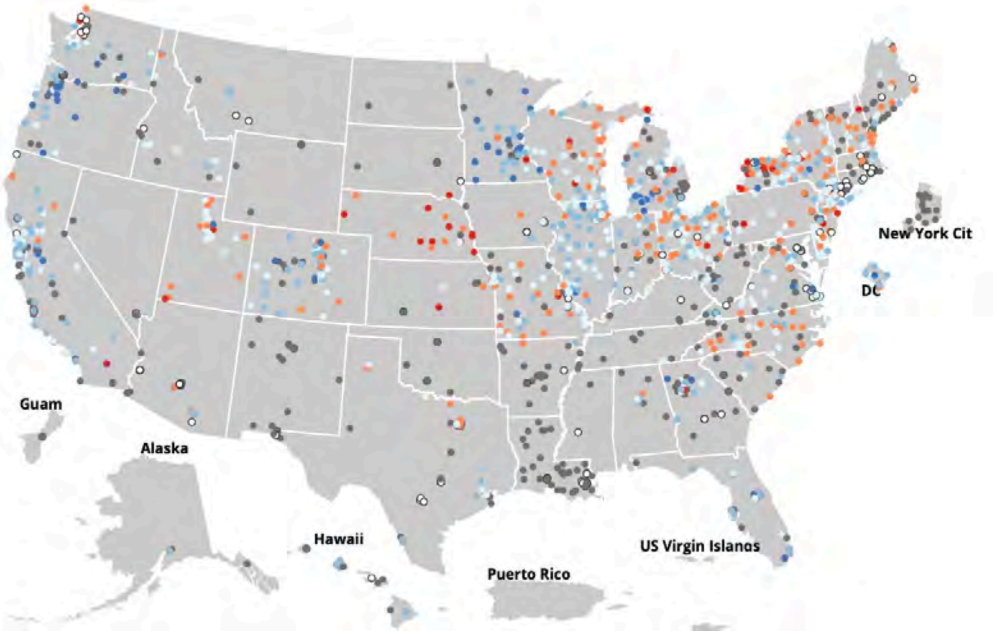
COVID-19 Wastewater Surveillance



Current virus levels category	Num. sites	% sites	Category change in last 7 days
New Site	198	17	0%
0% to 19%	70	6	9%
20% to 39%	265	22	– 1%
40% to 59%	351	30	– 5%
60% to 79%	231	19	– 21%
80% to 100%	72	6	– 18%

October 22, 2023

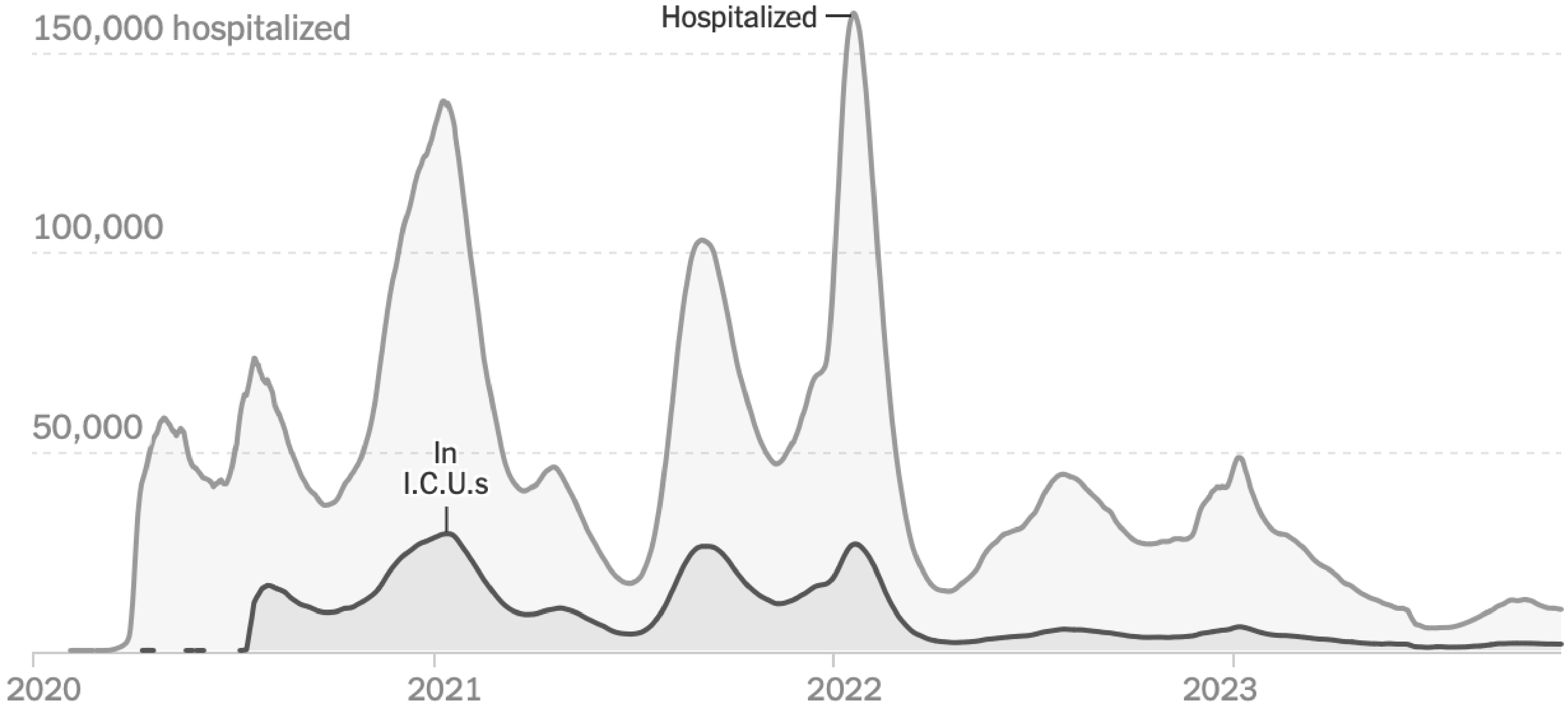
Current virus levels category	Num. sites	% sites	Category change in last 7 days
New Site	138	11	1%
0% to 19%	81	6	– 17%
20% to 39%	328	26	– 6%
40% to 59%	438	35	– 3%
60% to 79%	227	18	4%
80% to 100%	41	3	0%



November 17, 2023

Source: CDC – https://covid.cdc.gov/covid-data-tracker/#wastewater-surveillance Accessed 10-21-23

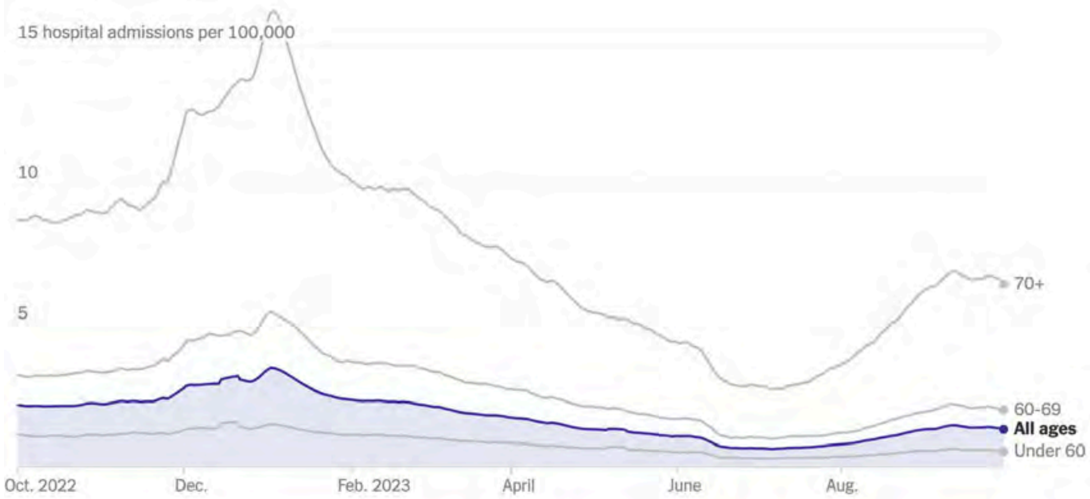
Hospitalizations and ICU Hospitalizations for COVID-19 in the United States



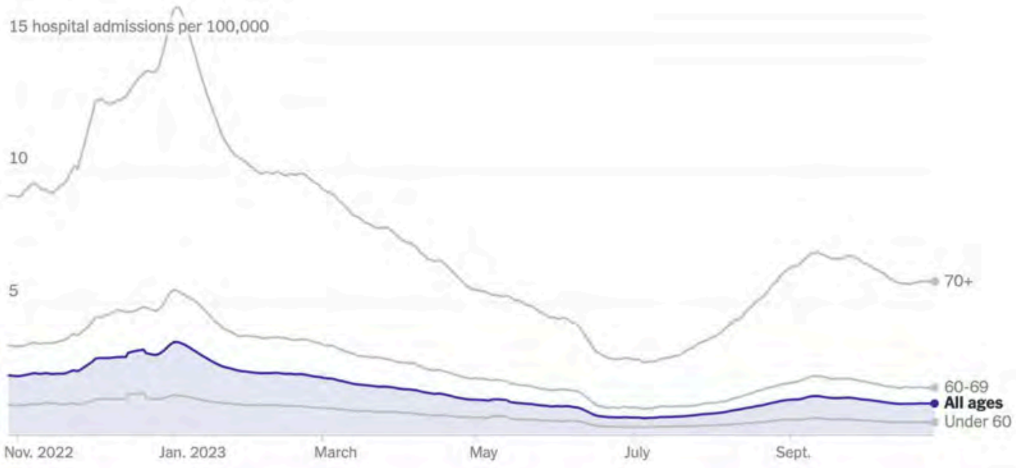
Hospitalizations decreased by 18.1% from our last Town Hall
ICU admissions decreased by 12.1% from our last Town Hall

Source: https://www.nytimes.com/interactive/2023/us/covid-cases.html accessed 11-17-23

COVID-19 DAILY HOSPITAL ADMISSIONS IN THE UNITED STATES, BY AGE



Data from 10/22/2023



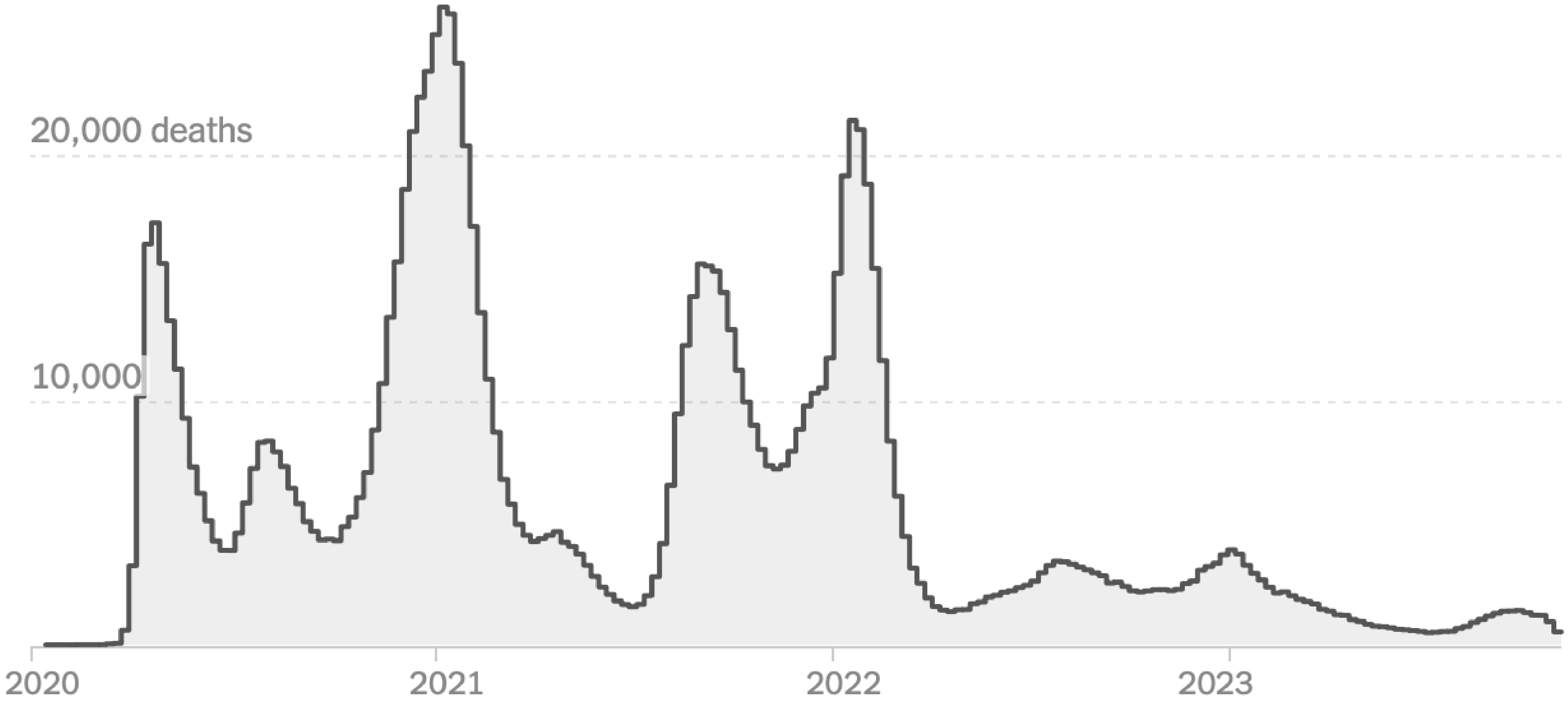
Data from 11/17/2023

Daily hospitalizations increased by 2.0% from two weeks ago

Source: New York Times 11-17-2023

COVID-19 DEATHS IN THE UNITED STATES

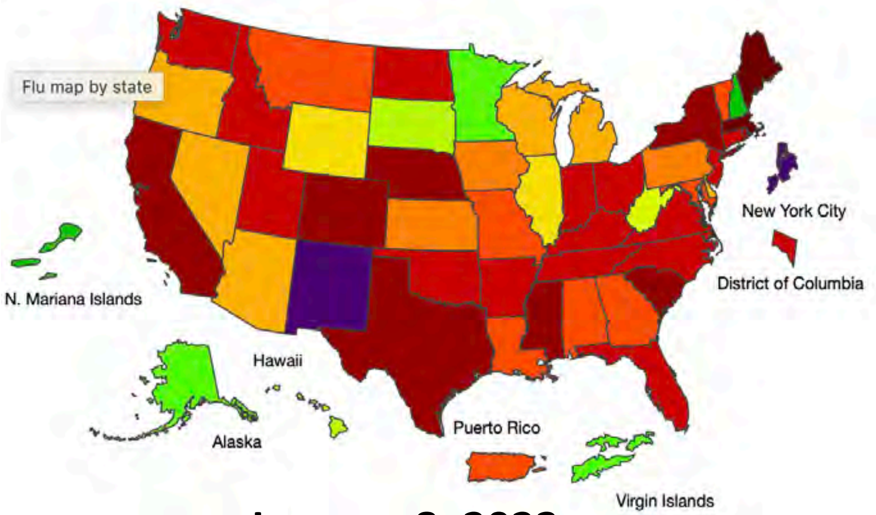
Cumulative Deaths – 1,143,192



56.8% decreased from our last Town Hall

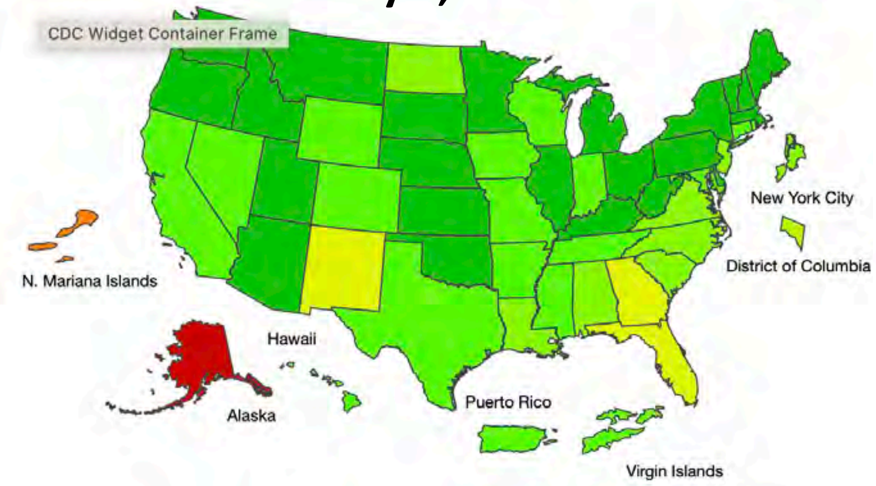
Source: NY Times https://www.nytimes.com/interactive/2023/us/covid-cases.html 11-17-23

INFLUENZA ACTIVITY BY STATE IN THE UNITED STATES

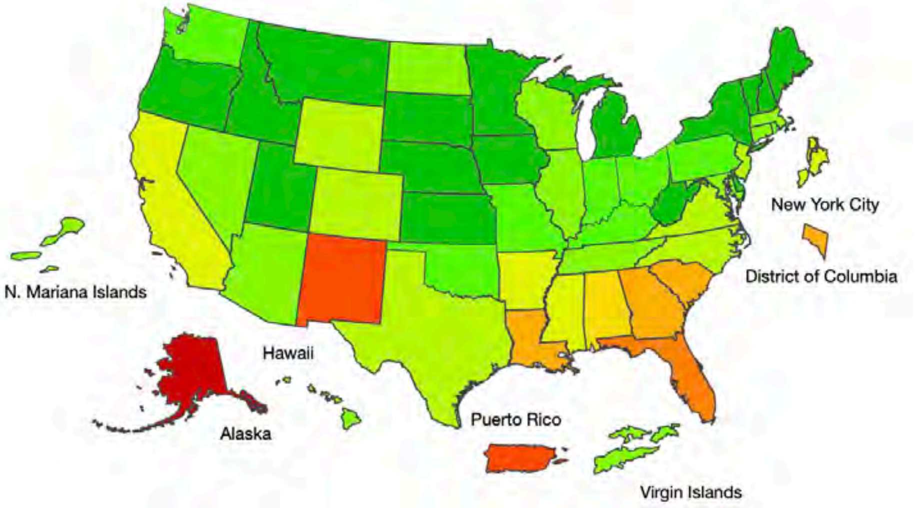


January 8, 2023

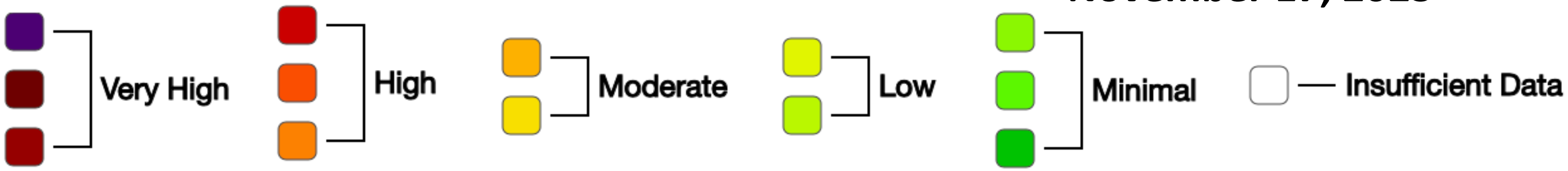
July 23, 2023



October 22, 2023

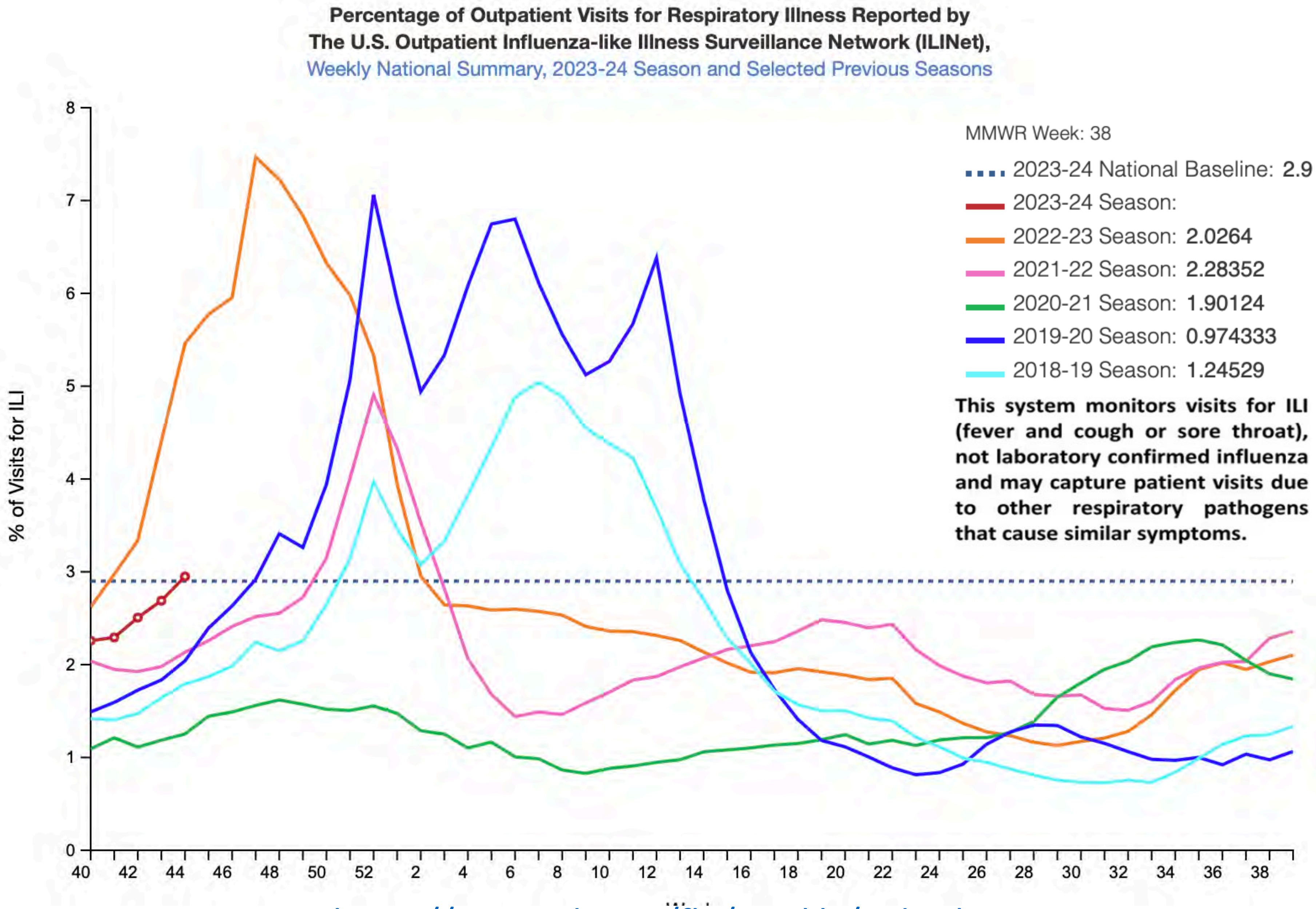


November 17, 2023



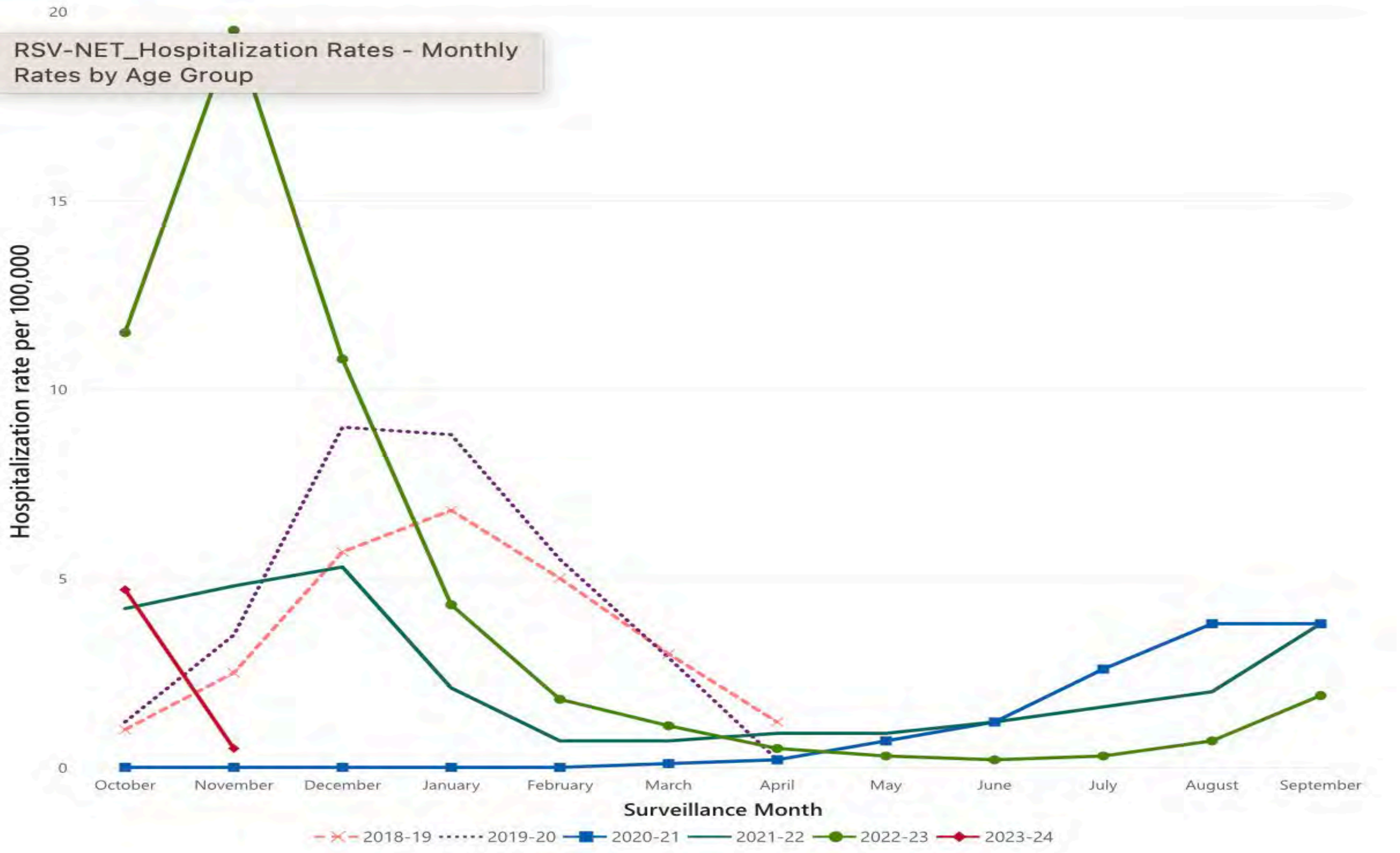
Source: CDC https://www.cdc.gov/flu/weekly/usmap.htm 11-17-23

PERCENTAGE OF OUTPATIENT VISITS FOR INFLUENZA-LIKE ILLNESS



Source: CDC – https://www.cdc.gov/flu/weekly/index.htm – 11-17-2023

HOSPITALIZATIONS FOR RESPIRATORY SYNCYTIAL VIRUS, U.S.



Source: CDC – https://www.cdc.gov/rsv/research/rsv-net/dashboard.html 11-17-23

This Month's Emerging Infectious Disease News

1. A **Nature** demonstrated that historical narratives about the COVID-19 pandemic are motivationally biased.
2. A **Nature Communications** paper found that aerosolized SARS-CoV-2 human monoclonal antibodies limited viral replication and lung pathology in macaques.
3. A letter to the editor of the **New England Journal of Medicine** describes an association of SARS-CoV-2 Infection during early weeks of gestation and situs inversus in newborns in China.
4. An article in the **New England Journal of Medicine** described the efficacy of convalescent plasma for COVID-19–Induced adult respiratory distress syndrome in mechanically ventilated patients.
5. An article in the **British Medical Journal** discusses what we know about COVID in immunocompromised patients.
6. A **JAMA** study describes the results of two randomized clinical trials demonstrating low probability of improving primary outcomes and survival associated with intravenous administration of Vitamin C in patients with COVID.
7. A **JAMA Network Open** study found that maternal mRNA vaccination was associated with a lower risk of Omicron SARS-CoV-2 infection among infants up to 6 months of age only if the vaccine was given during the antenatal period.
8. A **JAMA Internal Medicine** paper argues for the use of artificial intelligence in maintaining vigilance for health disinformation.

References available in the chat

This Month's Emerging Infectious Disease News

9. Another **JAMA Network Open** cross-sectional study of respiratory infections in children with and without medical complexity found a substantial decrease in severe respiratory disease during the first 2 years of the pandemic compared with the 3 pre-pandemic years.
10. Another **JAMA Network Open** study assessed nosocomial SARS-CoV-2 infections and mortality during unique COVID-19 epidemic waves.
11. An accompanying editorial in **JAMA Network Open** argues for the continued strategic use of interventions in healthcare settings to decrease risks for respiratory virus spread.
12. A **JAMA** paper from the NIH ACTIV program demonstrated lack of efficacy of higher-dose fluvoxamine in altering time to recovery in outpatients with COVID.
13. A **JAMA** opinion piece identifies physicians' refusal to wear masks for immunocompromised patients as an ethical dilemma
14. A preprint posted on **bioRxiv** last month suggests that concurrent administration of COVID-19 and influenza vaccines enhances spike-specific antibody responses.
15. The **Centers for Disease Control and Prevention** reported that approximately 36 Million adult Americans have received the updated COVID-19 vaccine**.**
16. A press release issued by **Pfizer-BioNTech** reported the results from Phase 1 and 2 trials of their new combination influenza and COVID vaccine and also announced the initiation of Phase 3 development of the vaccine.

References available in the chat

Panelists:

Dr. David Henderson
NIH Consultant

Dr. Sarah Haessler
Baystate Health

Dr. Tom Talbot
Vanderbilt University Medical Center

Dr. Kristina Bryant
University of Louisville

Dr. David Weber
UNC School of Medicine

COVID-19 UPDATE: FOCUS ON UTILITY OF WASTEWATER SURVEILLANCE

David J. Weber, MD, MPH, FIDSA, FSHEA, FRSM (London)
Sanders Distinguished Professor of Medicine, Pediatrics and Epidemiology
Associate Chief Medical Officer, UNC Medical Center
Medical Director, Hospital Epidemiology, UNC Medical Center
University of North Carolina at Chapel Hill

UNC SCHOOL OF MEDICINE

Disclosures: Consultancy; Pfizer, GSK, PDI, BD, GAMA, Germitec

FUTURE OF INFECTION PREVENTION

Infection Prevention Challenges

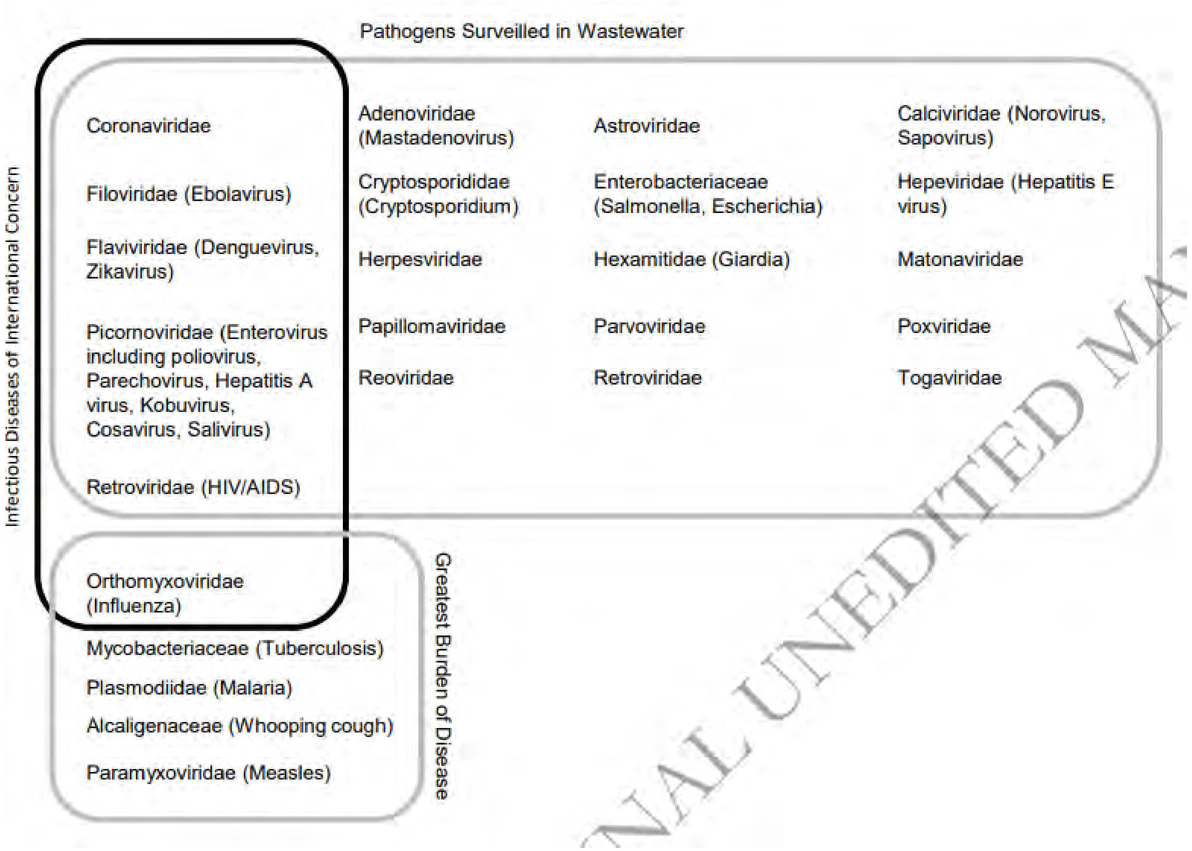
- Recovery from impact of COVID-19: Increased HAIs & MDROs
- Pathogens of concern
  - *Candida auris*
  - Non-tuberculous mycobacteria
  - CRE
- Emerging infectious diseases
  - COVID-19
  - Mpox
  - Hemorrhagic fevers (Ebola, Marburg, Lassa)
  - Disease "X"
- Maintaining continued reduction of HAIs (goal = 0)
- Workforce challenges
- Aging population and increased care in nursing homes and limited studies on infection prevention in nursing homes

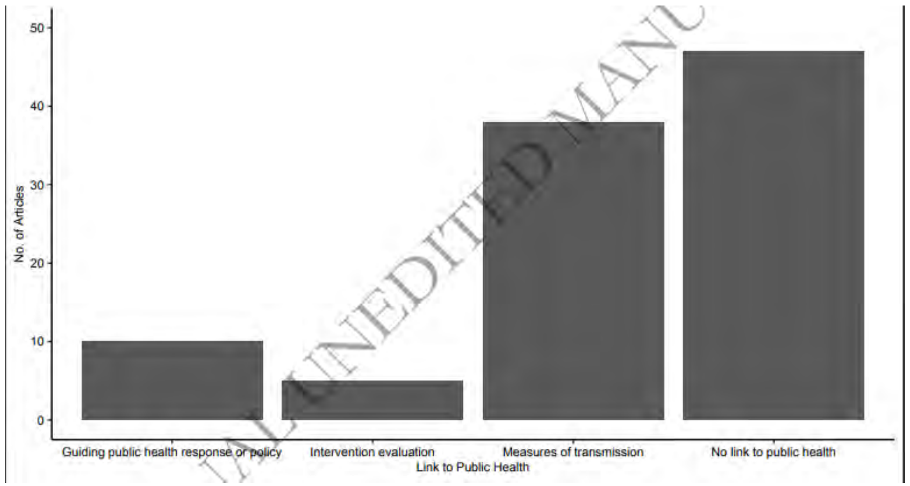
Advances in Prevention of HAIs

- New paradigm for infection prevention departments
- Expanded surveillance
  - Non-device infections (plus inclusion in guidelines)
  - Machine learning
  - Including patient-level risk data
  - Wastewater surveillance: SARS-CoV-2, mpox, MDROs?
- Implementation science: Guidelines -> bundles, clinical pathways, best practices, checklists, time outs, tool kits,
- Antimicrobial stewardship (CDI, MDR-GNRs, etc.)
  - Diagnostic stewardship
- Molecular techniques: Whole genome sequencing (WGS) for diagnosis and infection prevention, metagenomics
- New technologies (e.g., "no touch" disinfection, minimally invasive surgery, new devices {UV-C endocavity probe HLD})

WASTEWARE SURVEILLANCE FOR INFECTIOUS DISEASES

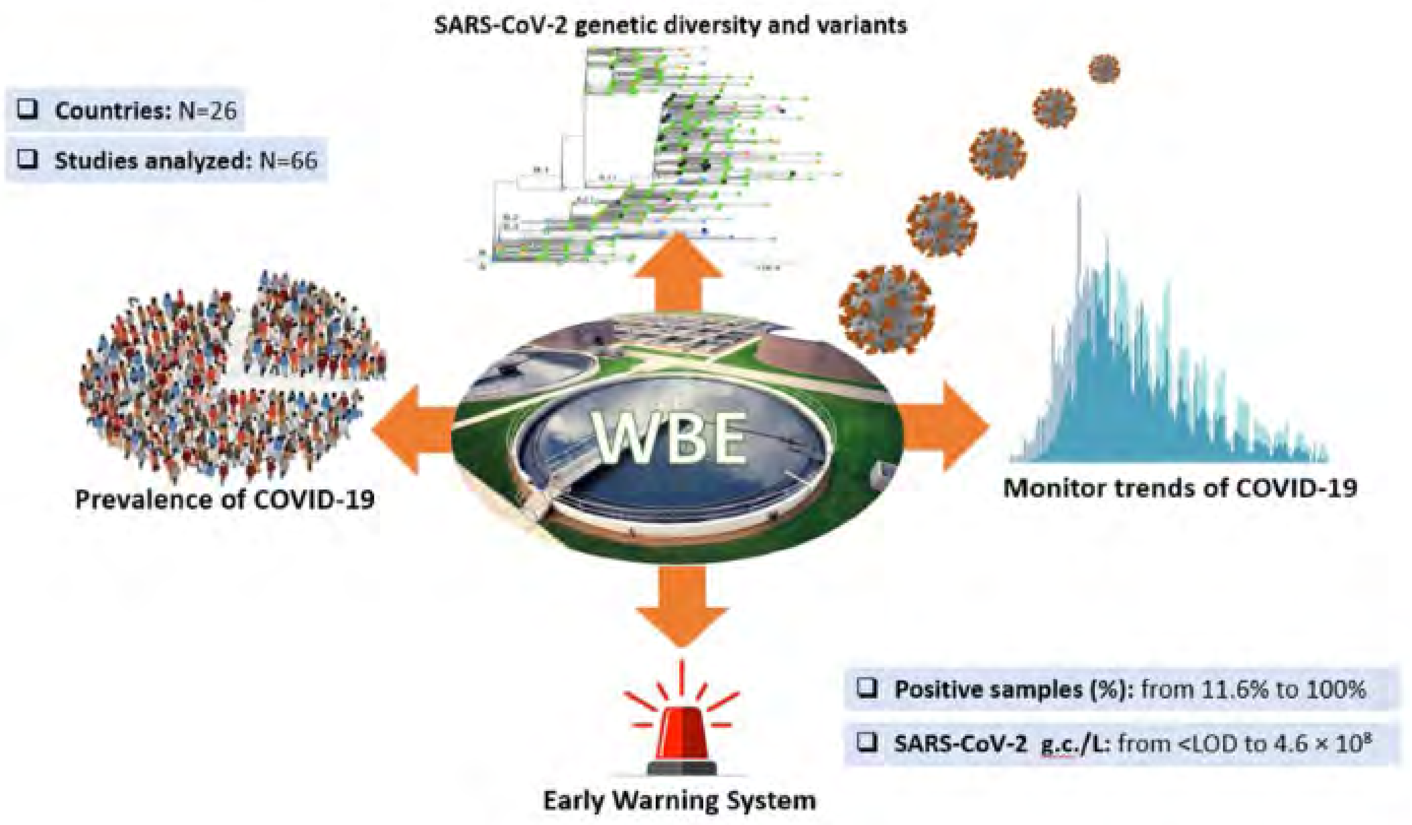
- Demonstrated value in monitoring SARS-CoV-2
- May predict impending surges
- Useful for assessing prevalence
- Not dependent on treatment-seeking behavior or access to care
- Challenges
  - Ensuring equity
  - Ensuring timeliness
  - Target selection: Pathogens public health significance, analytic feasibility, usefulness
- Studies: >100 papers, 38 countries
- Utility still under investigation
- Future: Assessing MDROs





Mello MM, et al NEJM 2023;388:1441; Kilaru P, et al. Am J Epidemiol 2023

Potential of Wastewater Surveillance for the Monitoring of the COVID-19 Pandemic

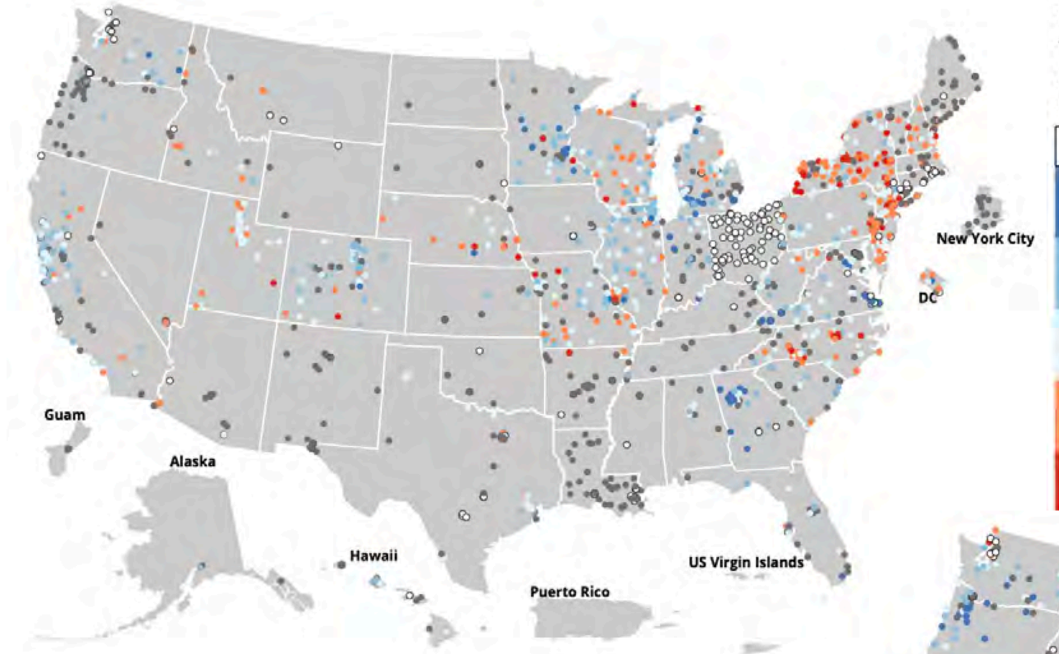


i Wastewater surveillance as an early warning system;
ii Wastewater surveillance to assess infection occurrence and trends, and its correlation with epidemiological measures;
iii Wastewater surveillance to estimate the prevalence of COVID-19 and its power to detect SARS-CoV-2 in a sewershed;
iv Wastewater surveillance to investigate SARS-CoV-2 genetic diversity and variants.

Keywords COVID-19 · SARS-CoV-2 · Wastewater · Surveillance · Sewage

Ferraro GB, et al
Foor and Environ Virology
2022;14:315-354

COVID-19 Wastewater Surveillance, CDC



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NATIONAL™ WASTEWATER SURVEILLANCE SYSTEM

NWSS

October 22, 2023

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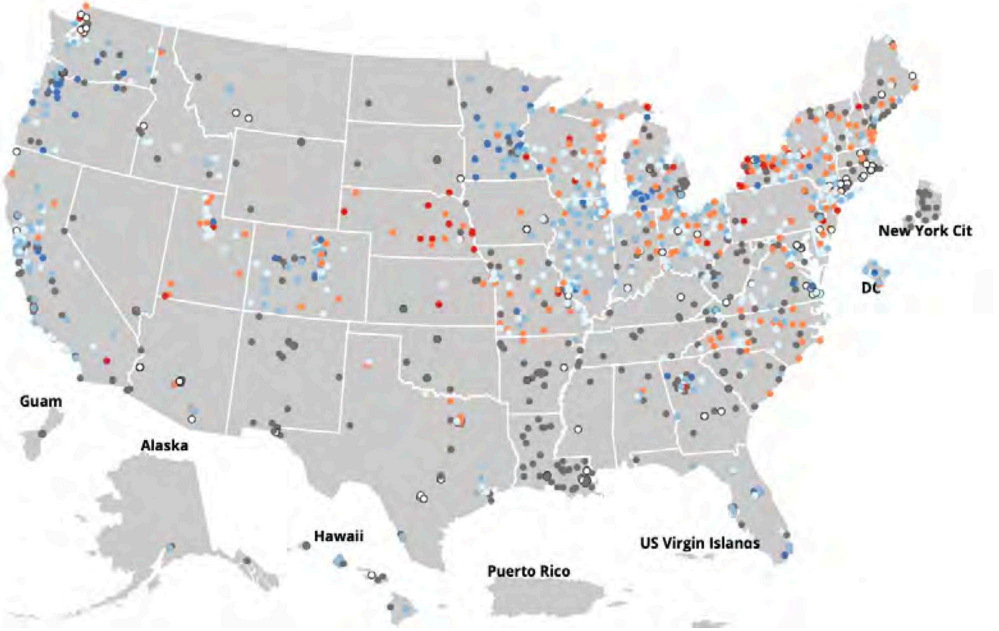


November 17, 2023

Source: *CDC – https://covid.cdc.gov/covid-data-tracker/#wastewater-surveillance Accessed 10-21-23*

NWSS Target Expansion

genomeweb

Business & Policy | Technology | Research | Diagnostics | Disease Areas | Applied

Home » Tools & Technology » PCR

CDC Greatly Expands Number of Infectious Disease Targets for National Wastewater Surveillance

Jun 14, 2023 | Madeleine Johnson

Premium

NEW YORK – The US Centers for Disease Control and Prevention is moving forward on a planned expansion of the wastewater infectious disease surveillance efforts it pioneered during the pandemic.

Oregon State University researchers testing wastewater for the SARS-CoV-2 virus in 2021. Credit: OSU.

Scaled up to surveil sewage from nearly half of the US population for SARS-CoV-2 transmission, the agency now plans to also track gastrointestinal, respiratory, and antimicrobial resistant pathogens through the rollout of two dozen digital PCR wastewater surveillance targets next year.

The CDC's National Wastewater Surveillance System (NWSS) is currently collaborating with molecular diagnostics developer GT Molecular to create the digital PCR assays, as well as multiplex dPCR panels. The goal is to make the assays available as methods and kits to partners in public health labs for testing.

Added Respiratory:
Influenza A and B
Respiratory Syncytial Virus

Foodborne infections panel: Shiga toxin producing *Escherichia coli* (STEC)

Norovirus, *Campylobacter jejuni*
Adenovirus 40/41

AMR Panel: Includes genes that give bacteria the ability to break down antibiotics, encoding the enzymes carbapenemase and extended spectrum beta-lactamase (EBSL), as well as genes that confer resistance to colistin and vancomycin.

Candida auris

Wastewater monitoring can anchor global disease surveillance systems

To inform the development of global wastewater monitoring systems, we surveyed programs in 43 countries. Most programs monitored predominantly urban populations. In high-income countries (HICs), composite sampling at centralized treatment plants was most common, whereas grab sampling from surface waters, open drains, and pit latrines was more typical in low-income and middle-income countries (LMICs). Almost all programs analyzed samples in-country, with an average processing time of 2·3 days in HICs and 4·5 days in LMICs. Whereas 59% of HICs regularly monitored wastewater for SARS-CoV-2 variants, only 13% of LMICs did so. Our findings show the richness of the existing wastewater monitoring ecosystem. With additional leadership, funding, and implementation frameworks, thousands of individual wastewater initiatives can coalesce into an integrated, sustainable network for disease surveillance—one that minimizes the risk of overlooking future global health threats

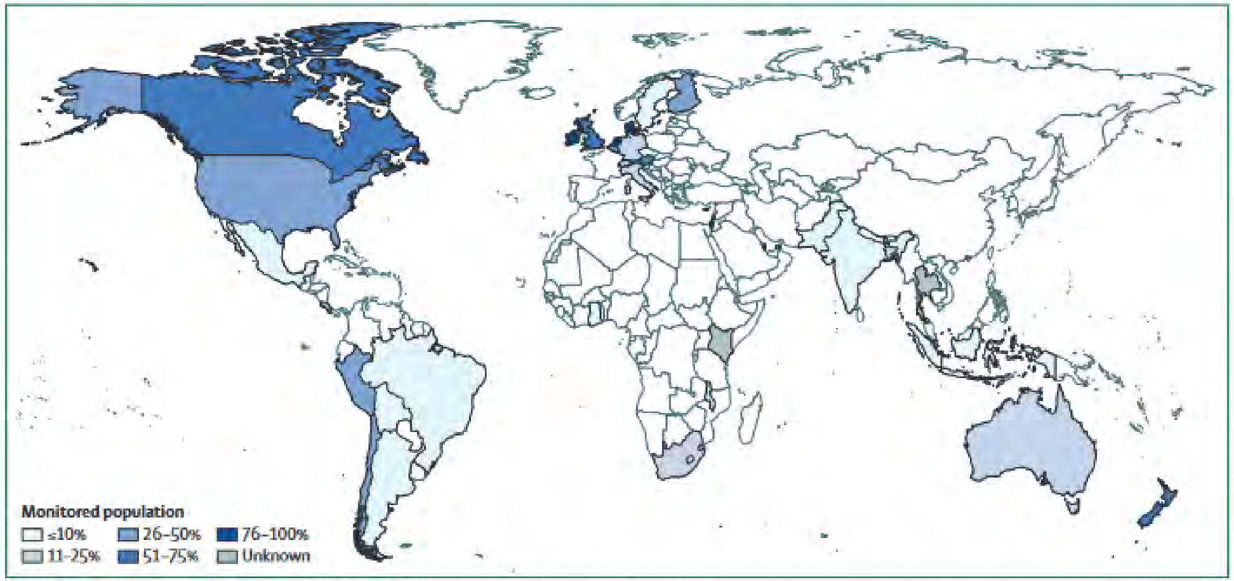
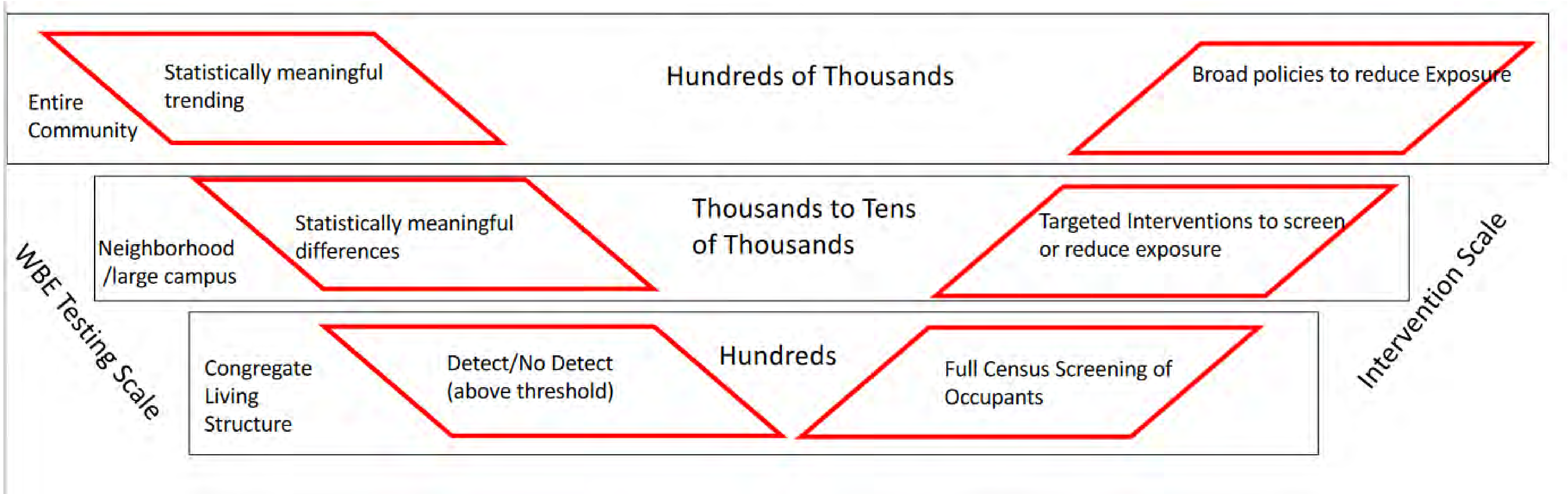


Figure: Population coverage of wastewater monitoring programmes in surveyed countries
This map shows the percentage of a country's population that was monitored through wastewater testing for the 43 (shaded) countries that responded to the wastewater survey.

Keshaviah A, et al. Health Policy 2023;11:e976-81

University of Louisville, Analysis and Action Plan



Slide curtesy of Dr. Ted Smith, UofL

National Wastewater Surveillance System (NWSS), CDC

Wastewater surveillance can provide an early warning of COVID-19's spread in communities.

People infected with SARS-CoV-2 can shed the virus in their feces, even if they don't have symptoms. The virus can then be detected in wastewater, enabling wastewater surveillance to capture presence of SARS-CoV-2 shed by people with and without symptoms. This allows wastewater surveillance to serve as an early warning that COVID-19 is spreading in a community. Once health departments are aware, communities can act quickly to prevent the spread of COVID-19. Data from waste-water testing support public health mitigation strategies by providing additional crucial information about the prevalence of COVID-19 in a community.

https://www.cdc.gov/nwss/wastewater-surveillance.html

How to Use COVID-19 Wastewater Data

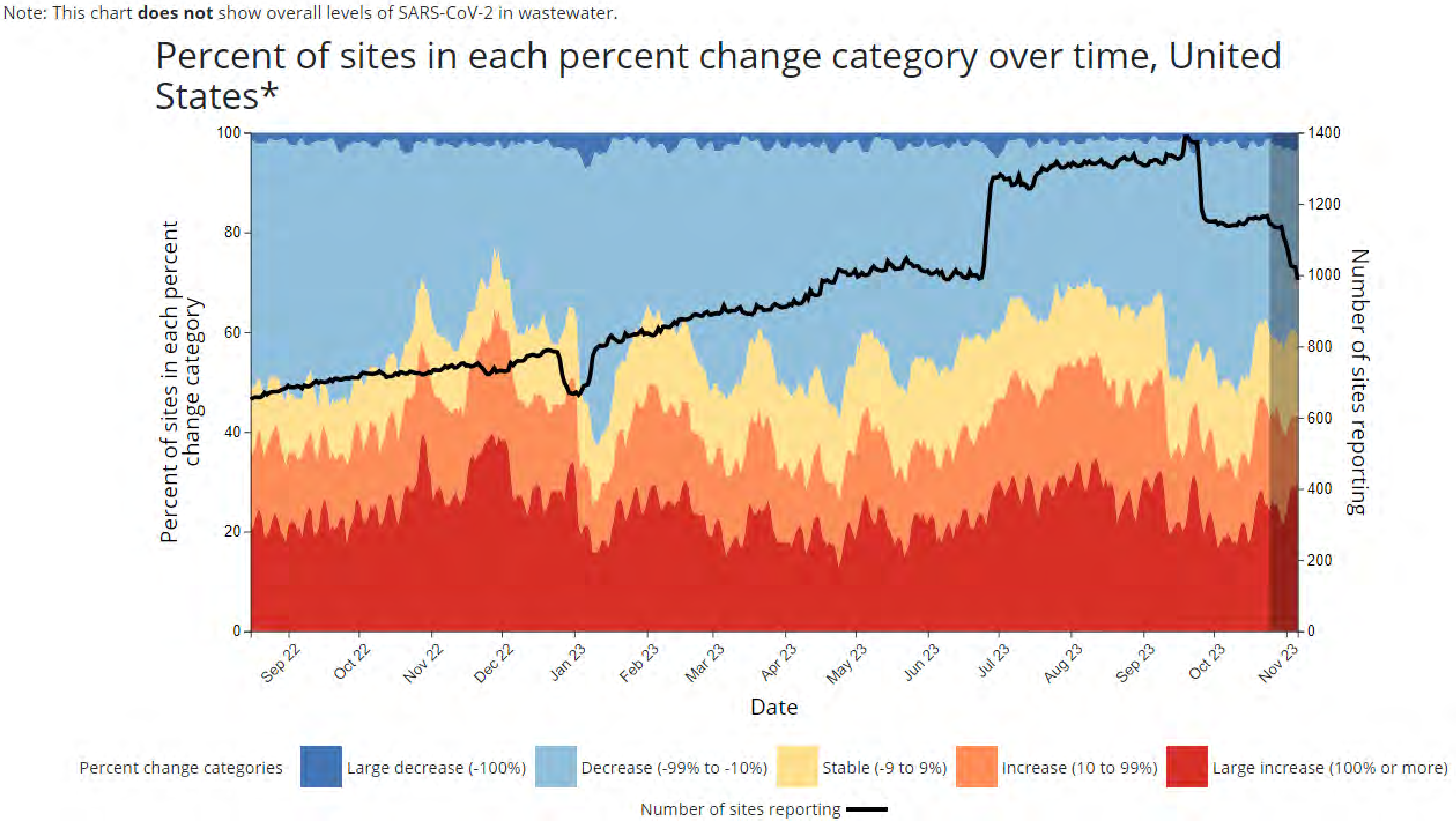
Wastewater data can be an important early warning signal and should be used alongside other data.

Wastewater surveillance data are most useful when used with other data. Wastewater data showing the percent change in virus levels should be used along with other data such as overall levels of the virus in wastewater, historical wastewater data for that location, geographical context (for example, whether areas have high tourism or neighboring communities with increasing cases), and clinical cases. Communities may see change in the virus wastewater levels as prevention strategies in their areas change.

Early warning systems, such as wastewater surveillance, can detect small changes as a signal for early action. It is important to note that when levels of virus in wastewater are low, a modest increase overall in the virus level can appear much larger as numbers are translated into percentages. For instance, a change from 1 unit to 2 units would be a percent change of 100%. A change from 500,000 units to 1 million units is also a percent change of 100%.

More data over time can give better, more reliable trends. Public health officials watch for sustained increasing levels of the virus in wastewater and use this data to inform public health decisions. State and local health officials track a variety of data and put this information together to understand the local COVID-19 situation and decide how to best respond.

COVID-19: Wastewater Surveillance: Wastewater Metric Chart, CDC



https://covid.cdc.gov/covid-data-tracker/#wastewater-surveillance

Detection of SARS-CoV-2 B.1.351 (Beta) Variant through Wastewater Surveillance before Case Detection in a Community, Oregon, USA

Genomic surveillance has emerged as a critical monitoring tool during the SARS-CoV-2 pandemic. Wastewater surveillance has the potential to identify and track SARS-CoV-2 variants in the community, including emerging variants. We demonstrate the novel use of multilocus sequence typing to identify SARS-CoV-2 variants in wastewater. Using this technique, we observed the emergence of the B.1.351 (Beta) variant in Linn County, Oregon, USA, in wastewater 12 days before this variant was identified in individual clinical specimens. During the study period, we identified 42 B.1.351 clinical specimens that clustered into 3 phylogenetic clades. Eighteen of the 19 clinical specimens and all wastewater B.1.351 specimens from Linn County clustered into clade 1. Our results provide further evidence of the reliability of wastewater surveillance to report localized SARS-CoV-2 sequence information.

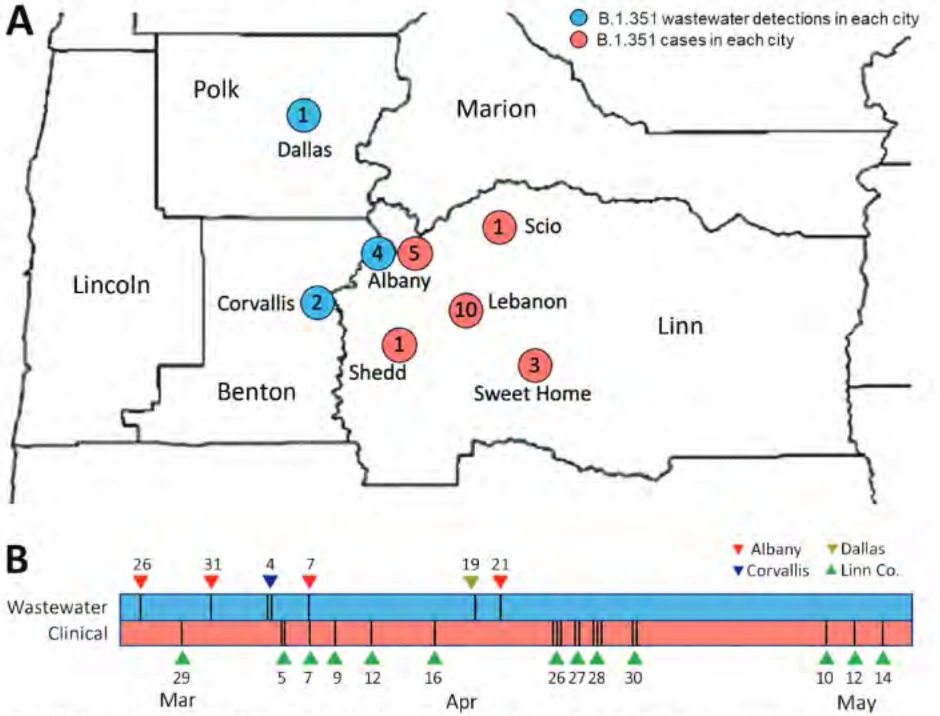


Figure 2. Location and timeline of emergence of SARS-CoV-2 variant B.1.351 in wastewater samples and clinical specimens in Linn County, Oregon, USA, and surrounding jurisdictions, March–May 2021. A) Blue dots represent the sites and numbers of wastewater samples with detections of the B.1.351 variant in Linn County and surrounding jurisdictions. Red dots represent the location and number of individual cases of B.1.351 in Linn County. Initial wastewater samples with evidence of the B.1.351 variant of concern were collected from Albany, Oregon, during March 26–31, 2021, and the first case of B.1.351 infection in Linn County was reported on April 23, 2021 (specimen collection date of April 7, 2021); 18 additional cases were identified through May 15, 2021, including cases with earlier specimen collection dates. B) Timeline of wastewater samples and clinical specimens positive for B.1.351 in Linn County and surrounding jurisdictions. Vertical bars indicate the number of samples or specimens collected on each date. City locations are not given to limit identifiability of individual case-patients.

Sutton M, et al EID 2022;28:1101-1109

National SARS-CoV-2 Genomic Surveillance, CDC

Monitoring Wastewater Surveillance Data

Wastewater surveillance for COVID-19 is a rapidly developing field. State, tribal, local, and territorial health departments participating in the National Wastewater Surveillance System (NWSS) submit testing data to CDC. CDC then standardizes and interprets these data and presents them in the COVID Data Tracker. How often sites collect wastewater samples and how frequently data are reported to CDC varies by health department.

Wastewater data are meant to be used with other COVID-19 surveillance data to better understand COVID-19's spread in a community

https://covid.cdc.gov/covid-data-tracker/#variant-summary

Correlation between SARS-CoV-2 RNA concentration in wastewater and COVID-19 cases in community: A systematic review and meta-analysis

Wastewater-based epidemiology (WBE) has been considered as a promising approach for population-wide surveillance of coronavirus disease 2019 (COVID-19). Many studies have successfully quantified severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA concentration in wastewater (CRNA). However, the correlation between the CRNA and the COVID-19 clinically confirmed cases in the corresponding wastewater catchments varies and the impacts of environmental and other factors remain unclear. The correlation between CRNA and new cases (either daily new, weekly new, or future cases) was stronger than that of active cases and cumulative cases. . Larger variations of air temperature and clinical testing coverage, and the increase of catchment size showed strong negative impacts on the correlation between CRNA and COVID-19 case numbers. These findings highlight the importance of viral shedding dynamics, in-sewer decay, WBE sampling design and clinical testing on the accurate back-estimation of COVID-19 case numbers through the WBE approach.

Li X, et al. J Hazardous Materials 2023;441:129848

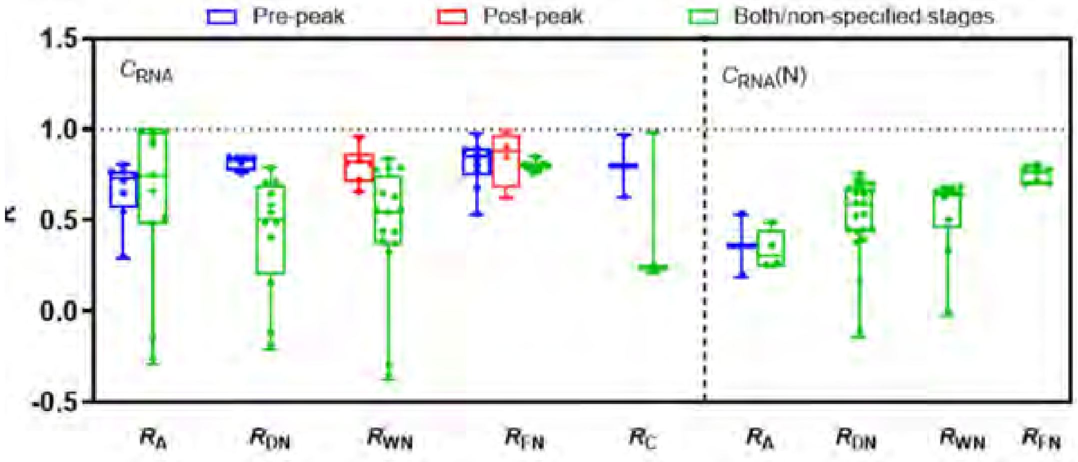


Fig. 1. Correlation coefficients (Pearson or Spearman correlation, R) that were reported in different studies between the raw SARS-CoV-2 RNA concentrations in wastewater (C_{RNA}) or normalized SARS-CoV-2 RNA concentrations in wastewater (C_{RNA}(N)) and P_A (R_A), P_{DN} (R_{DN}), P_{WN} (R_{WN}), P_{FN} (R_{FN}) and P_C (R_C). Blue, red and green indicates data associated with the pre-peak, post-peak and both/non-specified stages of the COVID-19 outbreak, respectively. The middle line of the box represents the median; the upper and lower lines represent the 25th and 75th percentiles; the whiskers extending the box and the outliers represent the data outside the interquartile range.

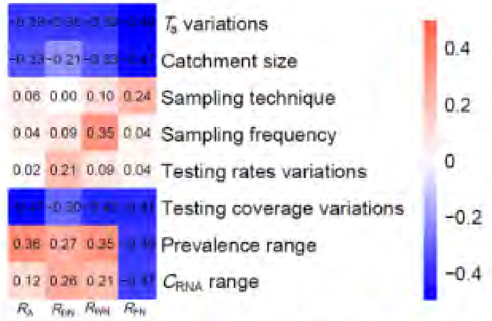


Fig. 2. Pairwise correlation plot between WBE correlation coefficients (R_A, R_{DN}, R_{WN}, P_{FN}) and environmental, sampling design, and epidemiological parameters. The Point-Biserial correlation was determined between sampling technique and WBE correlation coefficients, while Pearson correlations were determined for other parameters.

Wastewater-based epidemiology predicts COVID-19-induced weekly new hospital admissions in over 150 USA counties

Although the coronavirus disease (COVID-19) emergency status is easing, the COVID-19 pandemic continues to affect healthcare systems globally. It is crucial to have a reliable and population-wide prediction tool for estimating COVID-19-induced hospital admissions. We evaluated the feasibility of using wastewater-based epidemiology (WBE) to predict COVID-19-induced weekly new hospitalizations in 159 counties across 45 states in the United States of America (USA), covering a population of nearly 100 million. Using county-level weekly wastewater surveillance data (over 20 months), WBE-based models were established through the random forest algorithm. WBE-based models accurately predicted the county-level weekly new admissions, allowing a preparation window of 1-4 weeks. In real applications, periodically updated WBE-based models showed good accuracy and transferability, with mean absolute error within 4-6 patients/100k population for upcoming weekly new hospitalization numbers. Our study demonstrated the potential of using WBE as an effective method to provide early warnings for healthcare systems.

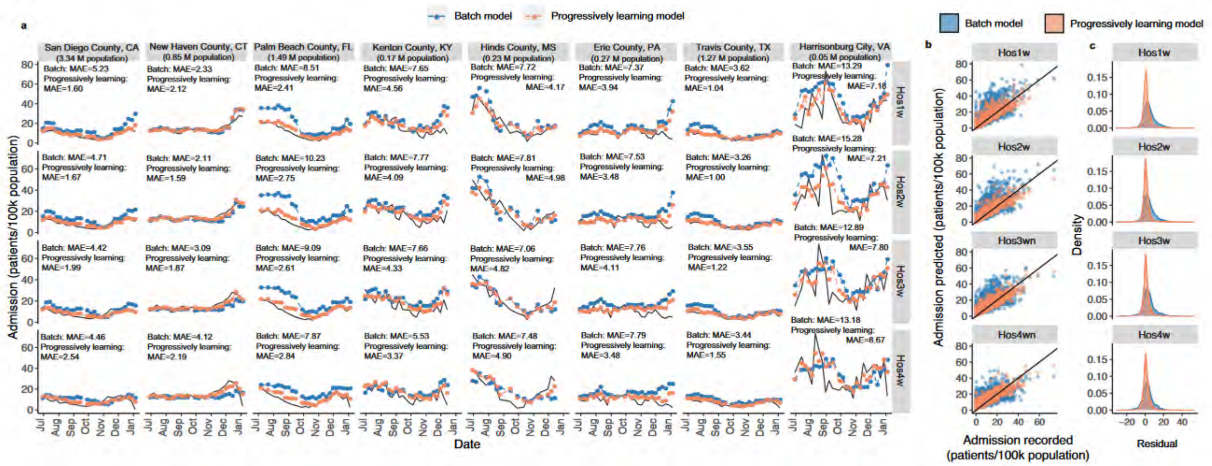


Fig. 5 | Comparison between actual admission records and the prediction results from batch models and progressive learning models for data in June 2022- January 2023. a The prediction results from the batch model (in blue) and progressive learning model (in orange) and the actual admission records (in black) for weekly new admissions in eight representative counties. Hos1w, Hos2w, Hos3w, Hos4w are the upcoming week, the second, third and fourth week after the wastewater sampling, respectively. **b** The prediction results from the batch model (in blue) and progressive learning model (in orange) verse the actual admission records for weekly new admissions. **c** The error distribution between prediction results and actual admission records for the batch model (in blue) and progressive learning model (in orange) for predicting weekly new admissions.

Li X, et al. Nature Communications 2023;14:4548

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High Sensitivity and Specificity of Dormitory-Level Wastewater Surveillance for COVID-19 during Fall Semester 2020 at Syracuse University, New York

A residential building's wastewater presents a potential non-invasive method of surveilling numerous infectious diseases, including SARS-CoV-2. We analyzed wastewater from 16 different residential locations at Syracuse University during fall semester 2020, testing for SARS-CoV-2 RNA twice weekly and compared the presence of clinical COVID-19 cases to detection of the viral RNA in wastewater. The sensitivity of wastewater surveillance to correctly identify dormitories with a case of COVID-19 ranged from 95% (95% confidence interval [CI]=76–100%) on the same day as the case was diagnosed to 73% (95% CI = 53–92%), with 7 days lead time of wastewater. The positive predictive value ranged from 20% (95% CI = 13–30%) on the same day as the case was diagnosed to 50% (95% CI = 40–60%) with 7 days lead time. The specificity of wastewater surveillance to correctly identify dormitories without a case of COVID-19 ranged from 60% (95% CI = 52–67%) on the day of the wastewater sample to 67% (95% CI = 58–74%) with 7 days lead time. The negative predictive value ranged from 99% (95% CI = 95–100%) on the day of the wastewater sample to 84% (95% CI = 77–91%) with 7 days lead time. Wastewater surveillance for SARS-CoV-2 at the building level is highly accurate in determining if residents have a COVID-19 infection. Particular benefit is derived from negative wastewater results that can confirm a building is COVID-19 free.

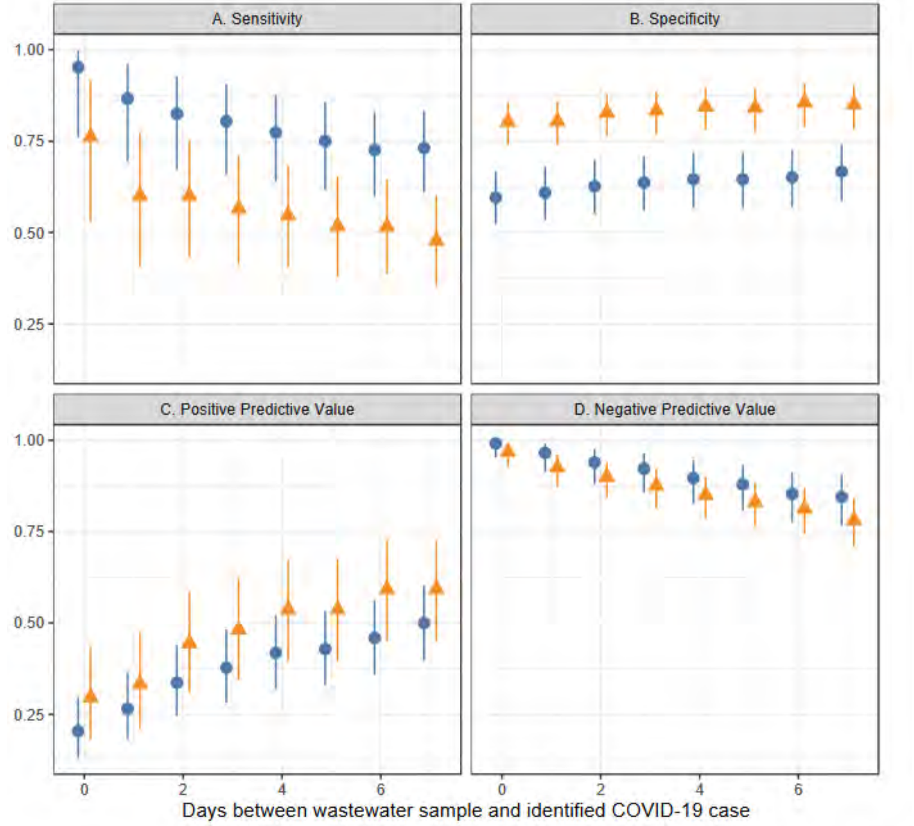

Figure 5. Sensitivity (**A**) to identify a building with a COVID-19 case using wastewater surveillance, specificity (**B**) to identify a building without a COVID-19 case using wastewater surveillance, positive predictive value (**C**) of a positive wastewater surveillance result to indicate a COVID-19 case among residents, and negative predictive value (**D**) of a negative wastewater surveillance result to indicate no COVID-19 cases among residents.

Godinez A, et al. Int J Environ Res and Public Health 2022;19:4851

Early detection of SARS-CoV-2 infection cases or outbreaks at nursing homes by targeted wastewater tracking

- This study involved five NH facilities (listed as A to E) located in northeast Valencia (Spain), affiliated to the Clínico-Malvarrosa Health Department. These are nursing or mixed nursing/care homes, altogether providing care for 472 residents attended by 309 staff.
- As shown in Table 1, SARS-CoV-2 RNA was detected in wastewater samples collected from four out of the five NH (A, B, D, E). SARS-CoV-2 infection cases among residents or staff, either asymptomatic or symptomatic, were documented in three of the four NH (A, B, E)
- Presence of SARS-CoV-2 RNA in sewage preceded identification of isolated cases among residents or staff (in both cases symptomatic) or outbreak declaration in two NH with lag times ranging from 5 to 19 days.

Table 1
Detection of SARS-CoV-2 in wastewater, residents and staff at nursing homes included in the study

Nursing home (no. of residents/no. of staff)	Surveillance period	Date of first detection of SARS-CoV-2 RNA in wastewater[a]/day at which peak RNA levels (log_{10} GC/L) was reached	Date of first reported case of SARS-CoV-2 infection at the nursing home	No. of residents testing positive for SARS-CoV-2[b,c]	No. of staff testing positive for SARS-CoV-2[b,c]	Last SARS-CoV-2 infection case documented among residents or staff	Previous outbreaks
A (103/58)	14 October to 28 December	21 October/29 October (4.5)	9 November	1[d]	—	9 November	Yes (16 June)
A (103/58)	14 October to 28 December	10 December/28 December (8.6)	17 December	25	13	Outbreak ongoing	Yes (16 June and 21 October)
B (105/60)	6 November to 28 December	6 November/19 November (4.5)	11 November	—	1[e]	11 November	Yes (17 June and 5 October)
C (48/25)	6 November to 28 December	ND	NR	—	—		No
D (101/81)	7 October to 28 December	7 October/12 November (6.9)	NR[f]	—	—	—	Yes (9 July)
E (115/85)	7 October to 28 December	26 October/30 October (8.3)[g]	17 October	14	10	16 November	Yes (17 June and 13 July)

ND, not detected; NR, not reported.

Davo L, et al.
Clin Microbiol Infect 2021;27:1061

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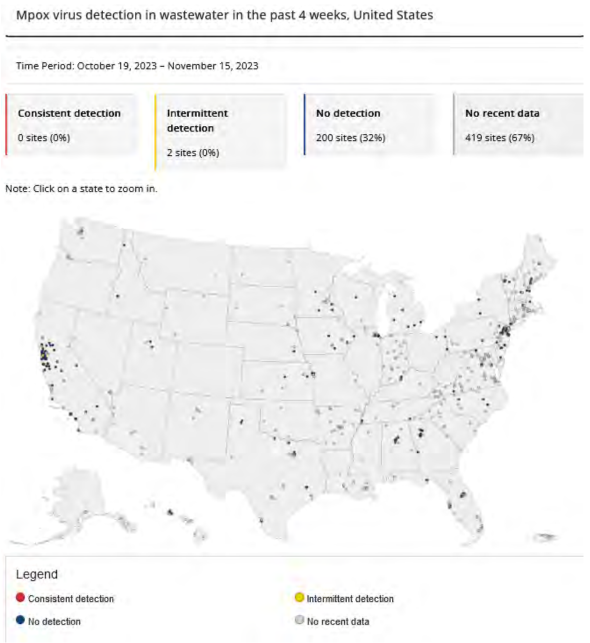
CONCLUSIONS

- Wastewater surveillance increasing being used for surveillance of infectious diseases
- Demonstrated utility
  - Community circulation of rare/uncommon diseases (e.g., Polio virus {100 samples, 2022}, NY; mpox, US)
  - COVID-19 variants, early detection
  - Infection in closed locations (COVID-19; nursing homes, college dorms, prisons, etc.)
- Potential utility (in conjunction with other data)
  - Predicting surges
  - Estimating number of persons infected
- Variables
  - Sampling methods (intermittent, continuous)
  - Temperature, humidity, pathogen, etc.
  - Need infectious fluid to enter wastewater stream (exceptions = diapered children and adults)\
- Future
  - Sampling for MDROs (e.g., *C. auris*, CRE, etc.)



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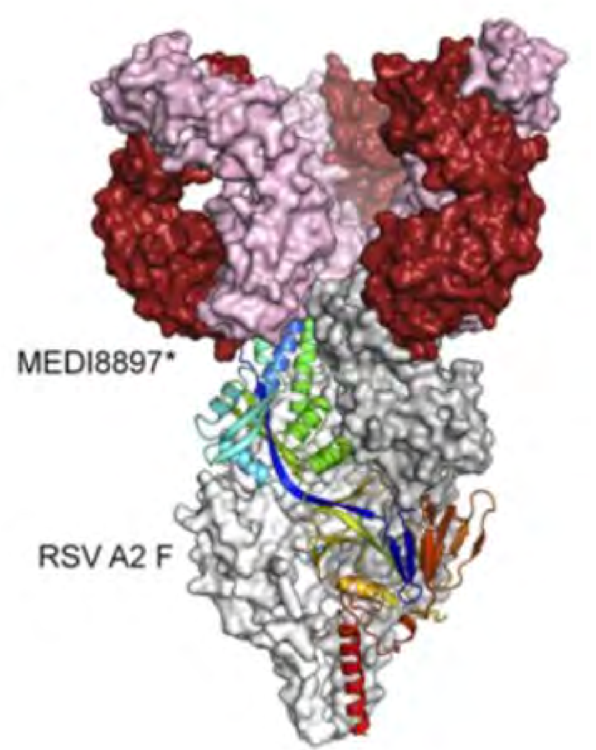
Update on RSV Prevention

Kristina Bryant, MD
University of Louisville
Norton Children's Hospital

Norton Children's

UofL School of Medicine

Nirsevimab



Qing Zhu et al..Sci. Transl. Med.9,eaaj1928(2017).

Long-acting recombinant human immunoglobulin G1 kappa monoclonal antibody

One dose projected to protect at least 5 months

Included in Vaccines for Children

Nirsevimab: What is the Evidence?

Outcome	Efficacy estimate*	Concerns in certainty of assessment
Benefits		
Medically attended RSV LRTI	79.0% (95% CI: 68.5%–86.1%)	None
RSV LRTI with hospitalization	80.6% (95% CI: 62.3%–90.1%)	None
RSV LRTI with ICU admission	90.0% (95% CI: 16.4%–98.8%)	Serious (imprecision): Too few events
Death due to RSV respiratory illness	None recorded	N/A
All-cause medically attended-LRTI	34.8% (95% CI: 23.0–44.7%)	None
All-cause LRTI-associated hospitalization	44.9% (95% CI:24.9%–59.6%)	None

*Pooled phase 2b (excluding underdosed) and phase 3 trial estimate comparing nirsevimab arm to placebo arm

Who Needs Nirsevimab?

Infants* < 8 months entering their first RSV season

Children 8-19 months at increased risk for severe RSV disease entering second RSV season

- Chronic lung disease of prematurity requiring medical support
- Severely immunocompromised
- Cystic fibrosis
  - Previous hospitalization for pulmonary exacerbation in the first year of life OR
  - Abnormalities on chest imaging that persist when stable OR
  - Weight-for-length that is <10th percentile
- American Indian and Alaska Native

https://www.aap.org/en/patient-care/respiratory-syncytial-virus-rsv-prevention/nirsevimab-frequently-asked-questions/
https://emergency.cdc.gov/han/2023/han00499.asp

Nirsevimab after Maternal RSV Vaccine

What are the potential exceptions?

Both maternal vaccine and infant nirsevimab are not necessary in most situations

Nirsevimab is recommended for

- **Infants born <14 days after maternal vaccination**
- **Infants whose mothers did not receive vaccine (or vaccination status unknown)**
- **Infants who mothers might not make antibodies or have inadequate placental transfer**
- **Infants who might have experienced loss of maternal antibodies (eg, cardiopulmonary bypass or ECMO)**
- **Infants with substantially increased risk for severe RSV disease (eg, hemodynamically significant congenital heart disease, or intensive care admission requiring oxygen at hospital discharge)**

Year One Challenges

Maternal vaccination status not always known to pediatrician

Private insurance coverage uncertain

Inadequate supplies

Equity

Nirsevimab: Weight-based Dosing

Scenario	Dose (mg)
Born during or entering their first RSV season AND weight <5 kg	50
Born during or entering their first RSV season AND weight ≥5 kg	100
Aged 8–19 months at increased risk for severe disease AND entering their second RSV season	200*

Nirsevimab Updated Recommendations

For infants weighing <5 kg, recommendations unchanged

For infants weighing ≥5 kg, prioritize using 100mg nirsevimab doses in infants at highest risk of severe RSV disease:

- Young infants aged <6 months
- American Indian and Alaska Native infants aged <8 months
- Infants aged 6 to <8 months with conditions that place them at high risk of severe RSV disease: premature birth at <29 weeks' gestation, chronic lung disease of prematurity, hemodynamically significant congenital heart disease, severe immunocompromise, severe cystic fibrosis (either manifestations of severe lung disease or weight-for-length less than 10th percentile), neuromuscular disease or congenital pulmonary abnormalities that impair the ability to clear secretions

In palivizumab-eligible children aged 8–19 months, use palivizumab per AAP recommendations

Second season dosing on hold except for American Indian and Alaska Native children aged 8–19 months who are not palivizumab-eligible and who live in remote regions