

Guidance and responses were provided based on information known on 02.08.24 and may become out of date. Guidance is being updated rapidly; users should look to CDC and NE DHHS guidance for updates.

**NEBRASKA**  
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DEPT. OF HEALTH AND HUMAN SERVICES

# COVID-19 and LTC

## February 8, 2024



NEBRASKA INFECTION CONTROL ASSESMENT AND PROMOTION PROGRAM

# Presentation Information:

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Slides and a recording of this presentation will be available on the ICAP website:

<https://icap.nebraskamed.com/events/webinar-archive/>

Use the Q&A box in the webinar platform to type a question. Questions will be read aloud by the moderator. If your question is not answered during the webinar, please either e-mail NE ICAP or call during our office hours to speak with one of our IPs.



# Continuing Education Disclosures

- 1.0 Nursing Contact Hour and 1 NAB Contact Hour is awarded for the LIVE viewing of this webinar
- In order to obtain nursing contact hours, you must be present for the entire live webinar and complete the post webinar survey
- No conflicts of interest were identified for any member of the planning committee, presenters or panelists of the program content
- This CE is hosted by Nebraska Medicine along with Nebraska ICAP and Nebraska DHHS
- Nebraska Medicine is approved as a provider of nursing continuing professional development by the Midwest Multistate Division, an accredited approver by the American Nurses Credentialing Center's (ANCC) Commission on Accreditation

# **TMF Health Quality Institute Centers for Medicare & Medicaid Services (CMS) Quality Innovation Network – Quality Improvement Organization (QIN-QIO)**

**Monika Maxwell, RN, TeamSTEPPS Master Trainer  
Quality Improvement Specialist**

# NHSN Questions?

For assistance with the National Healthcare Safety Network (NHSN), go to the new [NHSN-ServiceNow](#) portal.

# Flu Season

**Oct. 1 – March 31** each season

- Calculated once each year
- Calculated about 45 days after the close of the first quarter
- Shows up on Care Compare, usually in the July update
- Submit staff flu data to NHSN on or before May 15 each year



**TIP:** Report staff flu data on April 1

# Care Compare Data

## Flu & pneumonia prevention measures - Long-stay residents

Percentage of long-stay residents who needed and got a flu shot for the current flu season

↑ Higher percentages are better

**99.5%**

National average: 94.7%  
Nebraska average: 95.7%

Percentage of long-stay residents who needed and got a vaccine to prevent pneumonia

↑ Higher percentages are better

**100%**

National average: 92%  
Nebraska average: 91.4%

# Address Vaccination Declines

- TMF website resources: [tmfnetworks.org](https://tmfnetworks.org)
- TMF video: [Safe Does Not Mean Zero Risk: COVID-19 Vaccines Are Safe](#) (3.11 mins.)



# Address Vaccination Declines

- TMF Motivational Interviewing Podcast Series:
  - › [Podcast #1: Giving GRACE](#) (8.06 mins.)
  - › [Podcast #2: Moving Forward with OARS](#) (8.4 mins.)
  - › [Podcast #3: Relating with RULEs](#) (8.47 mins.)
  - › [Podcast #4: Adopting the DARN CAT](#) (8.58 mins.)
- University of Pittsburgh Department of Psychiatry:  
[Motivational Interviewing Strategies for Addressing COVID-19 Vaccine Hesitancy](#)
- [TMF Motivational Interviewing Flowchart](#)

# Avoid the Unknown...

Ensure that all vaccines are counted. Avoid reporting “unknown” vaccine status in National Healthcare Safety Network (NHSN) by completing the **S-E-A-R-C-H**:

# S

**Search your state vaccine registry**

# R

**Review discharge documents closely**

# E

**Early vaccine discussion**

# C

**Check the resident's common working file**

# A

**Ask a pharmacist**

# H

**Hospital record request**

# How Vaccines Are Working



## CONTROL Disease

Reduce symptoms of illness, hospitalization and death

*Examples: Seasonal flu and COVID-19*

Immunity can wane over time, which is why we need vaccines each year



Epidemics may occur locally



Multiple infections can occur over a lifetime



## ELIMINATE Transmission

Absence of the disease-causing agent in a location

*Examples: Measles and polio*

United States has maintained measles elimination for almost 20 years and polio elimination since 1988



While measles or polio may enter the U.S. from unvaccinated individuals, the organism will die out if it does not find an unvaccinated person to infect



The risk for measles in the U.S. is usually low because most citizens are vaccinated beginning in childhood



Universal vaccination of infants and children is the only means of eliminating these diseases



## ERADICATE Disease

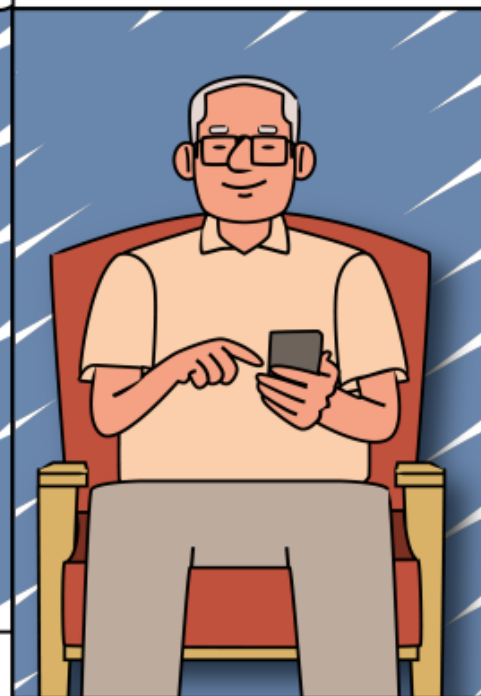
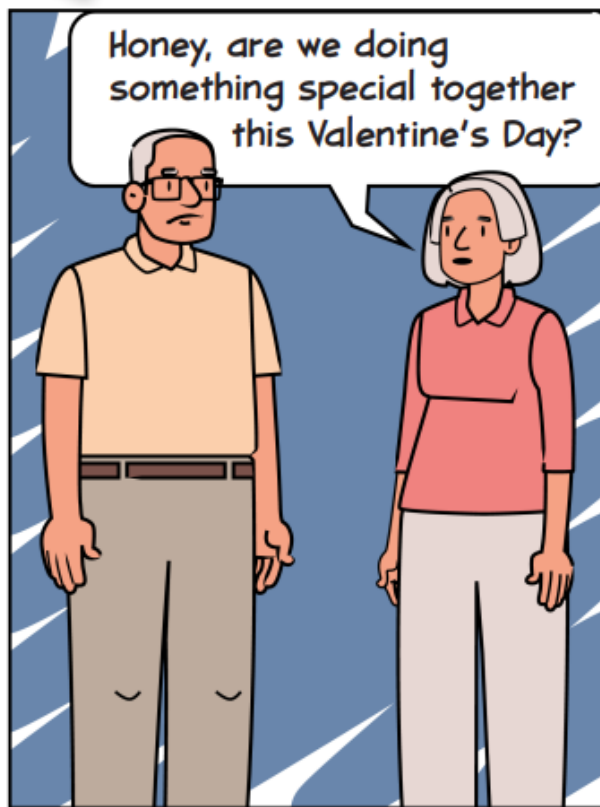
Worldwide absence of the disease-causing agent

*Example: Smallpox (only known disease to have been eradicated)*

Eradication is due to **vaccinations**



# Show Your Love This Valentine's Day



**Ask a nurse if you are up to date!**

# CMS-Targeted COVID-19 Training

Frontline nursing home staff and management **learning module test-out available** through the [CMS Quality, Safety & Education Portal](#)

- Five frontline nursing home staff modules with three hours total training time
- Ten management staff modules with four hours total training time
- [QSEP Group Training Instructions – English](#) (PDF)
- [QSEP Group Training Instructions – Spanish](#) (PDF)

# CMS-Targeted COVID-19 Training: New Tools

- User Guide: [CMS Targeted COVID-19 Training for Frontline Nursing Home Staff and Management](#)
- **Kudos Kit**
  - › [Customizable press release template](#)
  - › [Customizable, printable poster](#)
  - › [Standard, non-customizable, printable poster](#)
  - › [Customizable, printable badges for staff](#)
  - › [Customizable, printable badges for management](#)
  - › [Sample social media posts](#)





# February Nursing Home Connect Events

**Thursdays, 1:30 – 2:30 p.m. CT**

**Today: Feb. 8**

[How to Lead Effective  
Educational Sessions](#)

**Feb. 15**

[The Customer Service Experience  
for Nursing Homes](#)

**Feb. 22**

[Advance Care Planning](#)

**Feb. 29**

[QAPI Focus:  
Reducing Readmissions](#)

***Register [once](#) for multiple TMF QIN-QIO events.***

# TMF QIN-QIO Resources

- Website: [tmfnetworks.org](https://tmfnetworks.org)
  - › [How to Create an Account on the TMF Networks.org](#)
  - › [Calendar of Events](#)
  - › [Nursing Home Resources](#)
  - › [Quality Measures Video Series and Resources](#)
  - › [Quality Assurance Performance Improvement Video Series](#)
  - › [Nursing Home Recorded Events](#)



# Questions? Suggestions? Thoughts?

If your question was  
not answered in this  
session, please  
email us at:

[NHConnect@tmf.org](mailto:NHConnect@tmf.org)

Connect with us on  
Facebook:



[TMF QIN Nursing Home  
Quality Improvement](#)

# Strike Team Recap

Dr. Salman Ashraf

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NEBRASKA INFECTION CONTROL ASSESMENT AND PROMOTION PROGRAM

## Educational Requirement (1.a.i.)

- i. Train at least 2 staff members as infection preventionist between August 2022 and March 2024 in a nationally or regionally recognized infection preventionist training course consisting of a minimum 14 hours of training). Staff must not have received a formal infection preventionist training in the three years prior to taking this training.

State or nationally recognized infection preventionist training [e.g. training offered by Nebraska Infection Control network (NICN), Association for Professionals in Infection Control and Epidemiology (APIC), American Healthcare Association (AHCA)/National Center for Assisted Living (NCAL) or the Centers for Disease Control and Prevention (CDC).

2 most commonly used training

In-Person: NICN Registration Information: <https://icap.nebraskamed.com/2024/02/01/registration-is-open-for-the-ne-infection-control-network-nicn-primary-infection-prevention-course-march-13th-14th-2024/>

Virtually: CDC Train: [https://www.train.org/cdctrain/training\\_plan/3814](https://www.train.org/cdctrain/training_plan/3814)

*(2 staff SNF, 1 staff ALF)*

## Educational Requirement (1.a.ii.)

- ii. Train frontline staff (numbers based on size of the facility as follows) on the basic infection control topics to serve as “infection control champions” for the facilities. Training must consist of a minimum of 3-hours, include topics of hand hygiene, standard precautions, transmission-based precautions and environmental cleaning and disinfection, be either regionally or nationally recognized, and must be completed between August 2022 to March 2024 to be eligible for reimbursement.
- Facilities with >175 licensed beds must train at least 12 frontline staff
  - Facilities with 125-174 licensed beds must train at least 10 frontline staff
  - Facilities with 75-124 licensed beds must train at least 7 frontline staff
  - Facilities with 50-74 licensed beds must train at least 5 frontline staff
  - Facilities with <50 licensed beds must train at least 3 frontline staff

CDC Train Instructions: <https://icap.nebraskamed.com/wp-content/uploads/sites/2/2024/02/Nursing-Home-Strike-Team-IP-Champion-Training-4.5.2023-1.pdf>

Can use the training information provided in the document above to meet this requirement

*(SNF requirements listed above, ALFs see their respective requirements)*

## Educational Requirement (1.a.iii.)

- iii. Infection Control Champions must attend a 1-hour educational session organized by DHHS HAI/AR Program outlining their responsibilities as champions in addition to meeting the requirements of a.ii. (Note: If unable to attend any of the live virtual educational sessions for “infection control champion training”, the staff also have the option to attend the online “infection control champion training” at <https://icapasaplearning.nebraskamed.com/>)

IC Champion Training: <https://icapasaplearning.nebraskamed.com/>

# Reimbursement Submission

## What additional documentation is needed for reimbursement?

1. Facilities will need to provide the names of the staff who were trained as infection preventionists and infection control champions along with their certificate of completion.
2. If requesting for reimbursement for staff time, facilities will need to complete the “staff time reimbursement attestation form” provided by the DHHS
3. If requesting reimbursement for expenses related to course fees, lodging or travel expenses related to IPC education, submit relevant receipts and “airfare/mileage reimbursement form”.
4. DHHS reserves the right to request further documentation.
5. Incomplete forms or documentation will not be processed until they are complete. Incomplete applications may be denied.
6. Invoices will be submitted to Nebraska DHHS through an online REDCap form found here: <https://epi-dhhs.ne.gov/redcap/surveys/?s=JCMRD8YC9APPNFAE>

USE THIS LINK FOR REIMBURSEMENT:

<https://epidhhs.ne.gov/redcap/surveys/?s=JCMRD8YC9APPNFAE>

# Invoice Documentation

**LTCF Strike Team Reimbursement Form**

Note: Please verify with the Nebraska Long-Term Care Facilities Strike Team Related Educational and Fit Testing Expenses Reimbursement Guidelines that you meet the requirements before completing this form. We ask that you also please follow the below steps when submitting for reimbursement.

Step 1: Download Nebraska LTCF Strike Team Reimbursement Invoice Template below

Step 2: Fill out the Nebraska LTCF Strike Team Reimbursement Invoice Template with funds you are requesting

Step 3: Fill out all required reimbursement information in the form below

Step 4: Upload completed invoice at the end of survey in the file upload section along with all supporting documents.

Thank you!

Nebraska LTCF Strike Team Reimbursement Invoice Template:

Attachment: [Nebraska LTCF Strike Team Reimbursement Invoice Template.xlsx](#) (13.1 kB)

INVOICE #:	
<b>Your Company Name</b>	
Date Sent:	
Healthcare Associated Infections Program	
Company Address:	DHHS, State of Nebraska
Company Address:	PO Box 95026
Company phone:	Lincoln, NE 68509-5026
	(402) 471-2937
Primary Contact:	
Primary Contact Phone:	
Primary Contact Email:	
Facility Type:	
Information required for reimbursement	AMOUNT
Educational training course fees	\$ -
Mileage reimbursement for taking a course ( ___ miles x \$0.655 per mile)	\$ -
Lodging costs related to taking a course	\$ -
Airfare costs related to taking a course	\$ -
Staff time spent on education	\$ -
Staff time spent in getting trained in how to perform fit-test	\$ -
Staff time spent in performing N-95 fit-testing at the facility	\$ -
Please provide supporting receipts and documents as requested in REDCap:	
Subtotal	\$ -
Other	\$ -
<b>TOTAL DUE</b>	<b>\$ -</b>

## Staff Attestation from

**Reimbursement Information and Document Upload**

What type of facility are these charges being filed for:

\* must provide value

Note: Please upload all supportive documents below that align with charges filed on your invoice. Please combine all receipts, certificates, paystubs, etc. into one document when uploading. If filing for salary reimbursement, please upload the staff time attestation form below for each staff member you are requesting salary reimbursement.

Attachment: [Strike Team Project Staff Time Attestation Form.xlsx](#) (13.8 kB)

Nebraska LTCF Strike Team Reimbursement Invoice Upload: [Upload file](#)

Staff Time Attestation Form Upload: [Upload file](#)

Salary reimbursement supportive document: (Ex. paystub, staff log, etc.) [Upload file](#)

Travel Related Expense Supportive Document Upload: (Ex. mileage sheets, lodging receipts, airfare receipts, etc.) [Upload file](#)

Course Fee Receipt Upload: [Upload file](#)

Course Completion Certificate Upload: [Upload file](#)

Fit-tested Staff Log Upload: [Upload file](#)

Additional supportive document: [Upload file](#)

Additional supportive document: [Upload file](#)

Please use the provided staff attestation template when completing your reimbursement submission.

#	Staff Name	Activities Performed	Time Spent (in hours)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Name of person filling out this form: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Email Address: \_\_\_\_\_

Date this form was filled out: \_\_\_\_\_

Facility Name: \_\_\_\_\_

Facility Address: \_\_\_\_\_

Facility City: \_\_\_\_\_

Facility State: \_\_\_\_\_

Facility Zip: \_\_\_\_\_

☐ By checking, I hereby certify that, to the best of my knowledge, the provided information is true and accurate.



## Upload all required documents

		<b>INVOICE #:</b>	
<b>Your Company Name</b>			
		Date Sent:	
		Healthcare Associated Infections Program	
Company Address:		DHHS, State of Nebraska	
Company Address:		PO Box 95026	
Company phone:		Lincoln, NE 68509-5026	
		(402) 471-2937	
Primary Contact:			
Primary Contact Phone:			
Primary Contact Email:			
<b>Facility Type:</b>			

Information required for reimbursement	AMOUNT
Educational training course fees	\$ -
Mileage reimbursement for taking a course ( ___ miles x \$0.655 per mile)	\$ -
Lodging costs related to taking a course	\$ -
Airfare costs related to taking a course	\$ -
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Please provide supporting receipts and documents as requested in REDCap:	
Subtotal	\$ -
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Upload file

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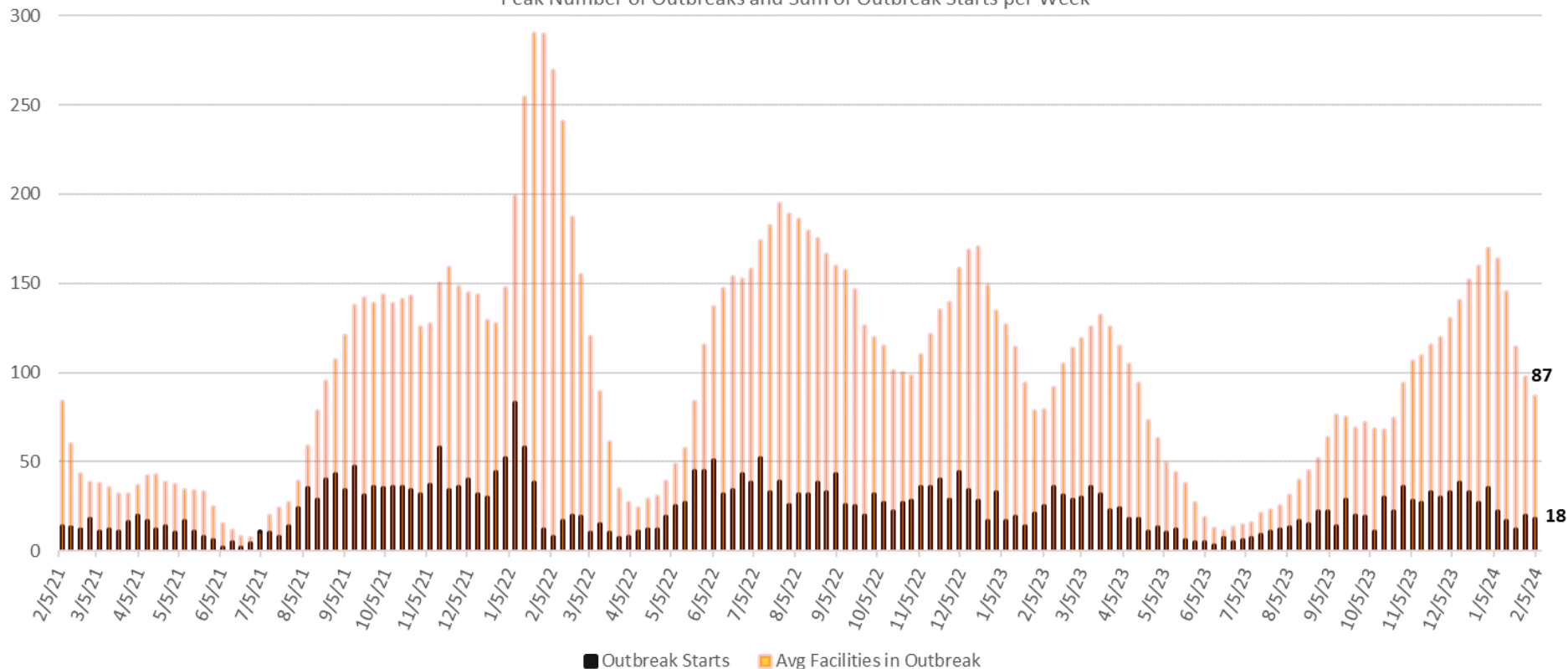
# Nebraska Statistics



# Nebraska LTC Facility COVID-19 Outbreaks

## Nebraska LTC Facilities in COVID Outbreak by Week

Peak Number of Outbreaks and Sum of Outbreak Starts per Week



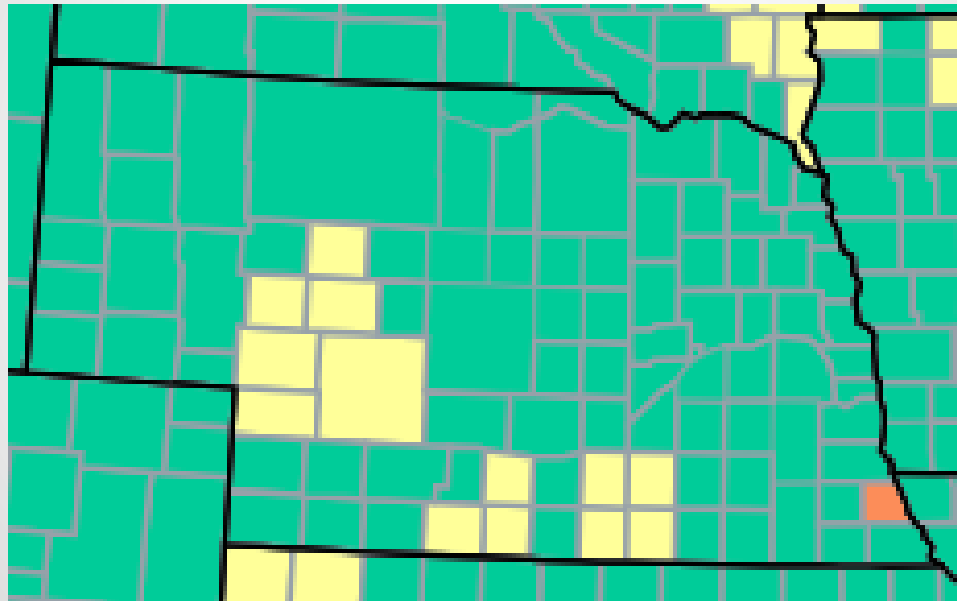
\*\*Updated: 2/5/2024

Source: Unofficial Counts Compiled by Nebraska ICAP based on data reported by facilities and DHHS; Actual numbers may vary slightly. Numbers reflect the peak during the week.

# CDC COVID-19 Data Tracker

## US Reported COVID-19 New Hospital Admissions Rate per 100,000 in the Past Week, by County

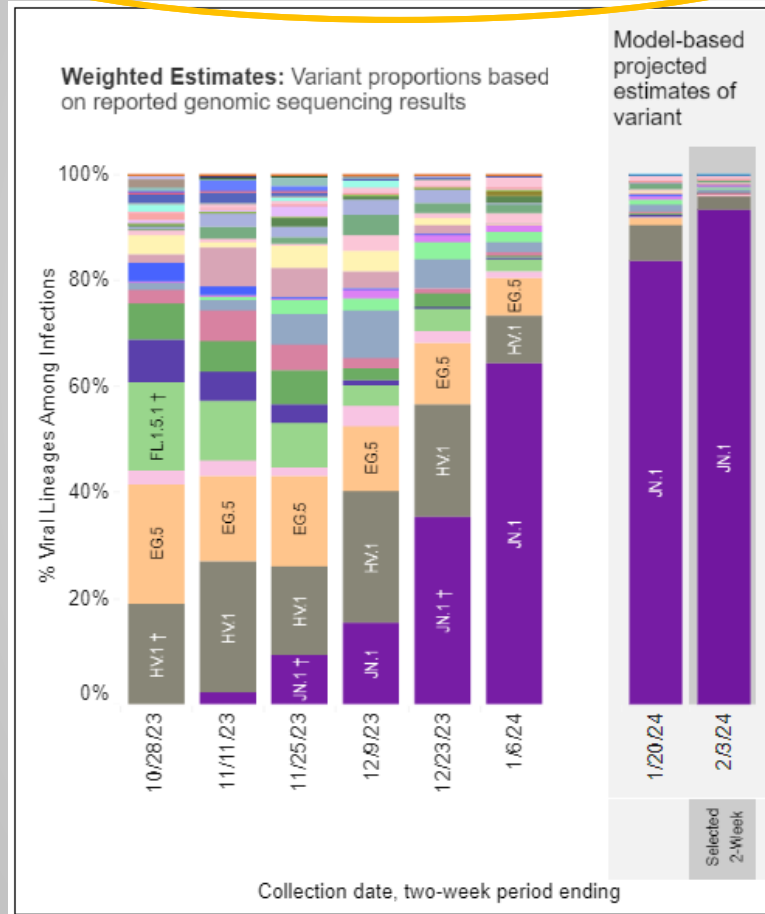
Time Period: New COVID-19 hospital admissions per 100,000 population (7-day total) are calculated using data from the MMWR week (Sun-Sat) ending December 30, 2023.



● Low (<10.0) ● Medium (10.0 to 19.9) ● High (≥20.0) ● Insufficient data

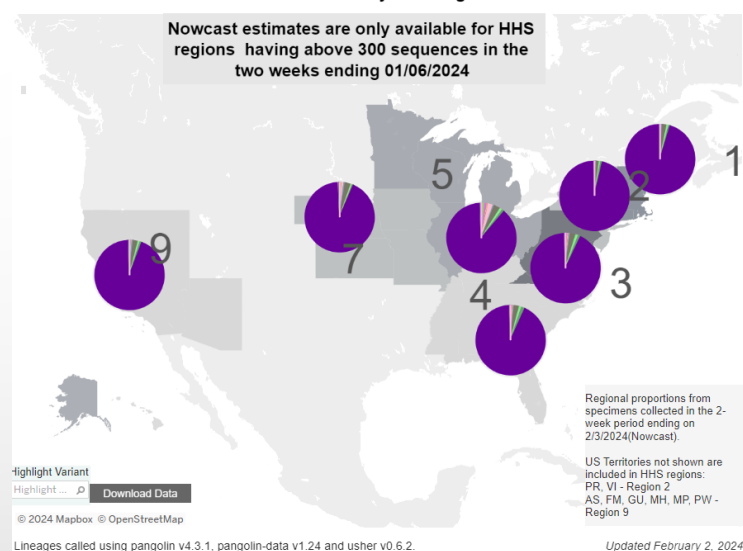
# What's happening with variants?

## Weighted Estimates in HHS Region 7 for 2-Week Periods in 10/15/2023 – 2/3/2024



## Weighted and Nowcast Estimates for two-week period 1/21/24 – 2/3/24

### Nowcast Estimates for 1/21/2024 – 2/3/2024 by HHS Region



# Wastewater Surveillance

Time Period: Jan 15, 2024 – Jan 29, 2024

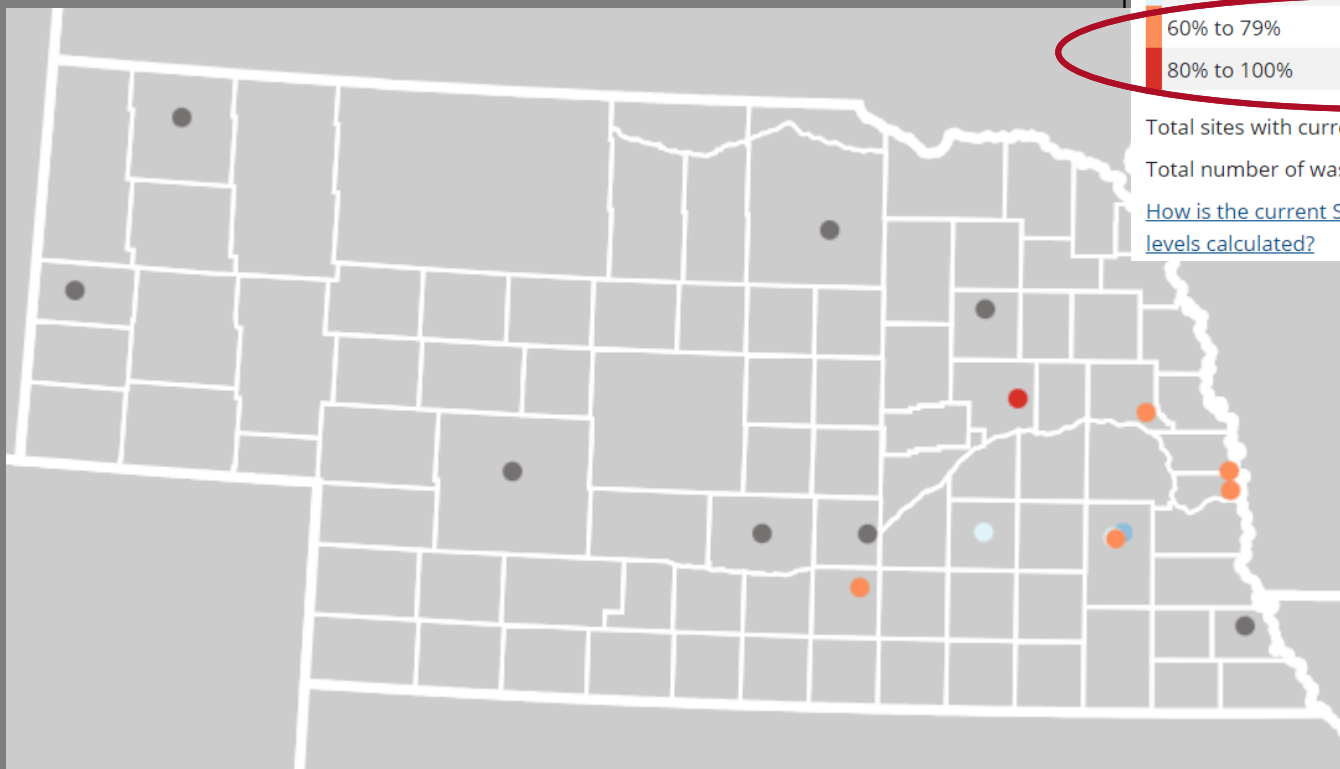
Current SARS-CoV-2 virus levels by site, Nebraska

Current virus levels category	Num. sites	% sites	Category change in last 7 days
New Site	1	7	0%
0% to 19%	0	0	N/A**
20% to 39%	1	7	0%
40% to 59%	5	33	0%
60% to 79%	6	40	- 14%
80% to 100%	2	13	100%

Total sites with current data: 15

Total number of wastewater sampling sites: 18

[How is the current SARS-CoV-2 level compared to past levels calculated?](#)



# Nebraska Flu Activity and Data

## Nebraska Influenza & Other Respiratory Disease Surveillance Report, 2023-24 Influenza Season, Week 04

(DATA THROUGH WEEK ENDING 1/27). All data are preliminary and may change as more reports are received.

### INFLUENZA LABORATORY SURVEILLANCE

Positive Influenza A & B Tests, Percent Positive, and Change from Last Week

Week Ending Date	Influenza A Positives	Change from Last Week	Influenza B Positives	Change from Last Week	Overall Percent Positive	% Change from Last Week
1/27/24	421	▲ 70	336	▲ 116	18.9%	▲ 3.0%
Grand Total	3,408		1,834			

Cumulative Influenza Positive Tests by Subtype and Age Group

	0-4	5-17	18-24	25-49	50-64	65+	Season Total
Flu A: H1	79	63	15	86	67	99	409
Flu A: H3	22	16	15	30	9	33	125
Flu B: Victoria	*	10	*	*	*	*	23

### LONG-TERM CARE FACILITY OUTBREAK SURVEILLANCE

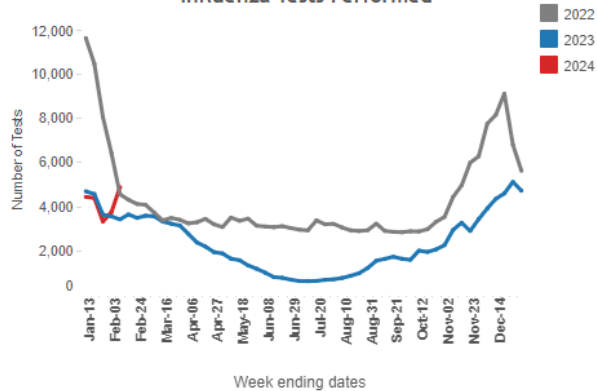
2 influenza-associated outbreaks have been reported for the surveillance season

### MORTALITY SURVEILLANCE

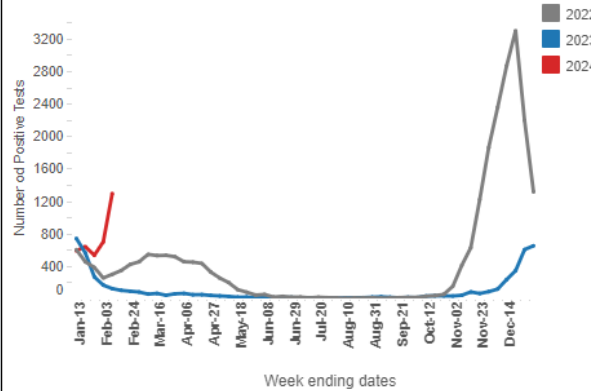
11 influenza-associated deaths have been reported for the surveillance season, including <6 pediatric deaths

# Nebraska Flu Activity and Data

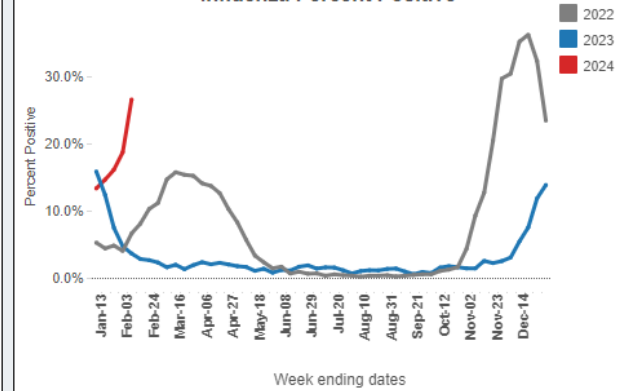
Influenza Tests Performed



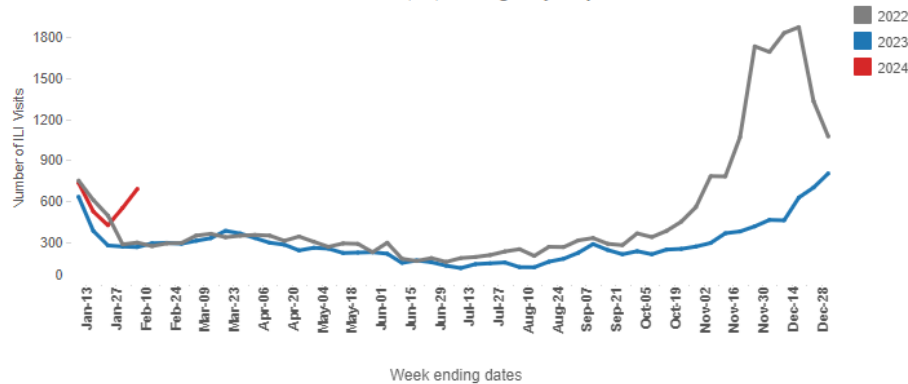
Positive Influenza Tests



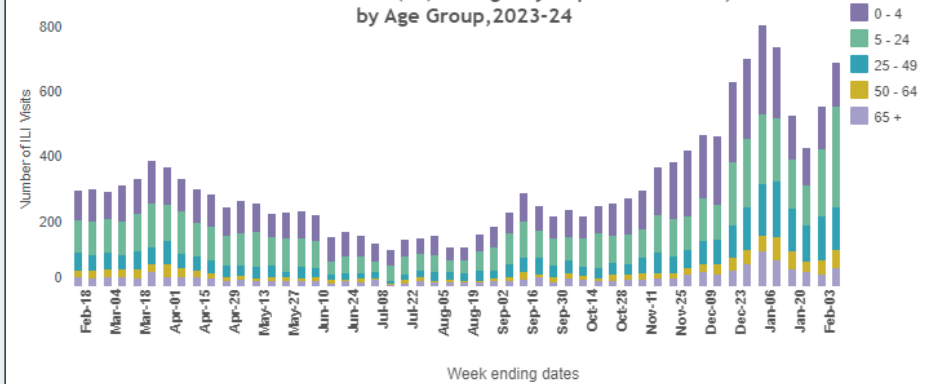
Influenza Percent Positive



Influenza-like Illness (ILI) Emergency Department Visits



Influenza-like Illness (ILI) Emergency Department Visits, by Age Group, 2023-24



RSV

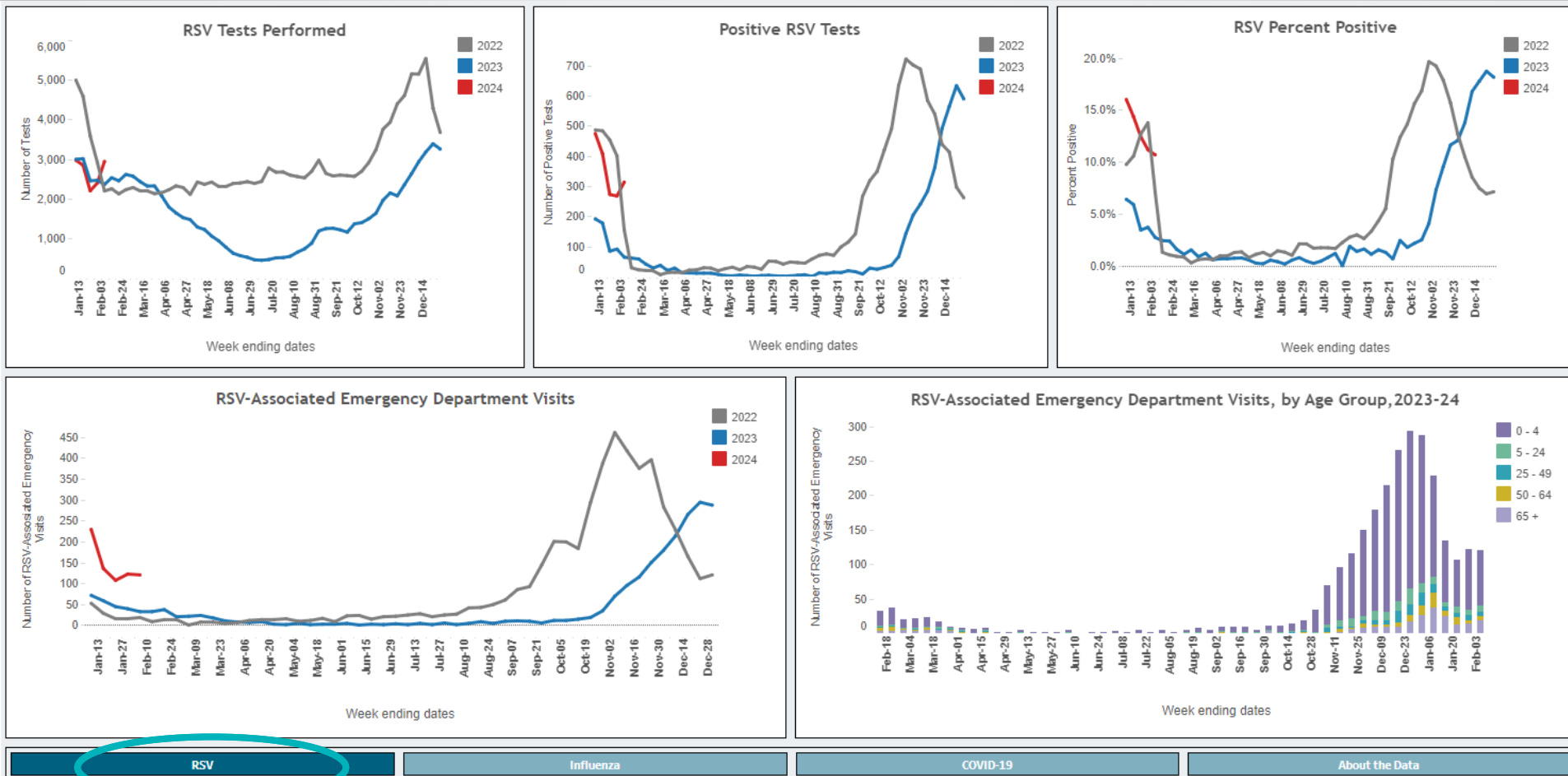
Influenza

COVID-19

About the Data



# Nebraska RSV Activity and Data



# Disease Transmission, Mitigation and Monitoring

**Joshua L. Santarpia**

Department of Pathology and Microbiology

Global Center for Health Security

# Dr. Joshua Santarpia, Ph.D.

## Current Affiliation(s):

Professor  
Department of Pathology, Microbiology and Immunology  
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University of Nebraska Medical Center

Science and Technology Advisor  
National Strategic Research Institute

## Former Affiliations:

Distinguished Staff  
Sandia National Laboratories

Senior Scientist  
The Johns Hopkins Applied Physics Laboratory

Senior Scientist  
Edgewood Chemical and Biological Center

## Associations:

Instructor  
American Association for Aerosol Research



<https://www.unmc.edu/pathology/faculty/bios/santarpia.html>

Research: aerobiology and aerosol science; building and facility sensing networks for biological detection; aerosol measurement tools for unmanned vehicles and biodetection/collection; physical signatures for detection and identification of biological aerosols, novel methods for studying bioaerosol hazards in clinical settings, characterization of SARS-CoV-2 aerosols in patient environments and risk in public spaces



# Outline

Disease transmission basics

Mitigation strategies

- Individual Protection
- Removal and Inactivation of Pathogen

Monitoring

- Human
- Wastewater
- Air

Resources



# Disease Transmission Basics



# Human-Human Disease Transmission

## Definition

Physical contact with an infectious person in a way that allows infection

Contact with a contaminated surface of object or exposure to infectious aerosols

## Types of Disease

Most diseases can spread this way

Infectious agent must leave the body, survive the environment, and contact susceptible host (measles, influenza, COVID-19, norovirus, etc.)

## Interventions

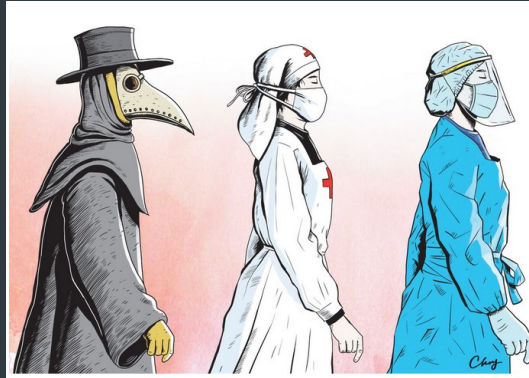
Preventing contact with infected person

Cleaning/Disinfection of surfaces  
Air filtration  
Social Distancing  
PPE (masks, gloves)

Direct Contact  
Indirect Contact

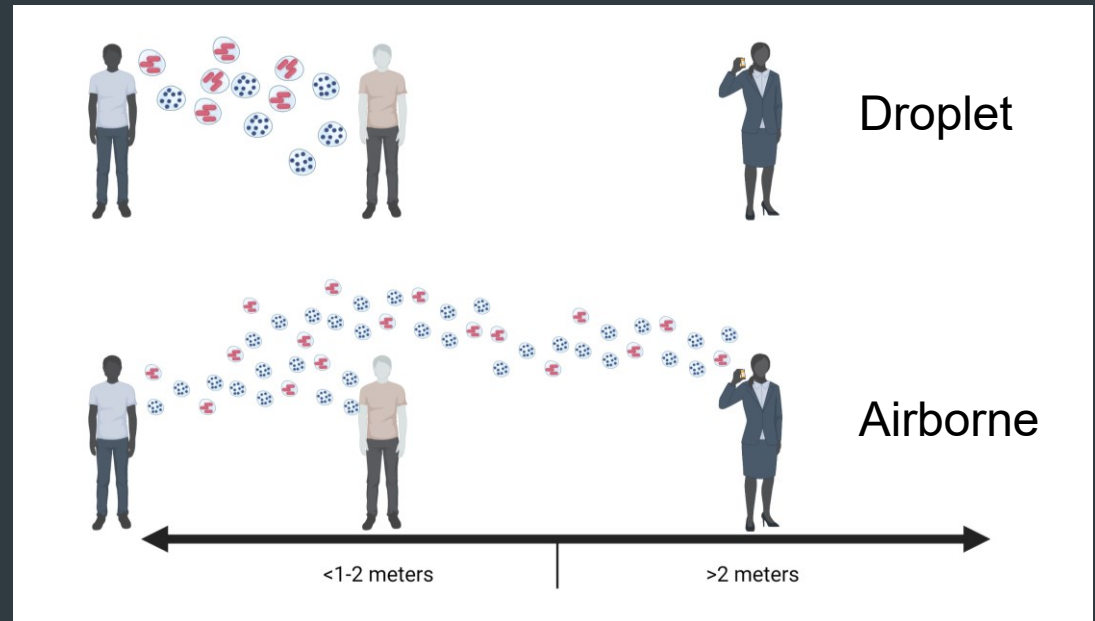
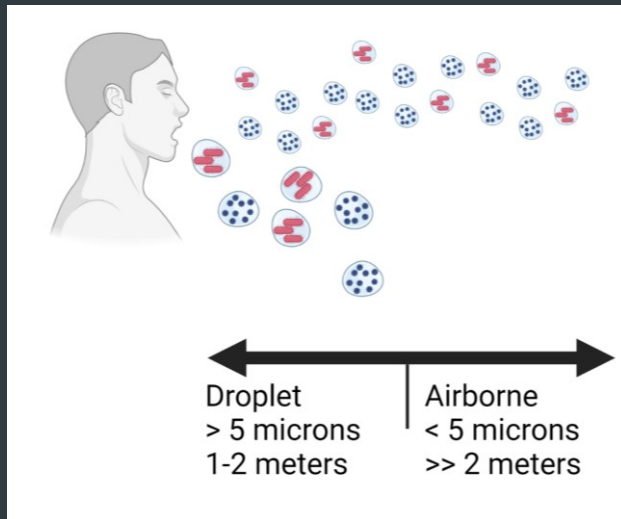


# Aerosols and Infectious Disease



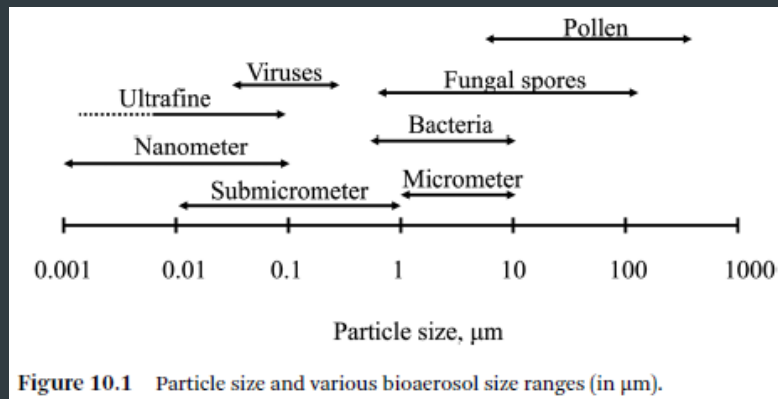
The evolution of PPE and our understanding of respiratory disease transmission

# The old way of thinking about droplet vs. airborne spread

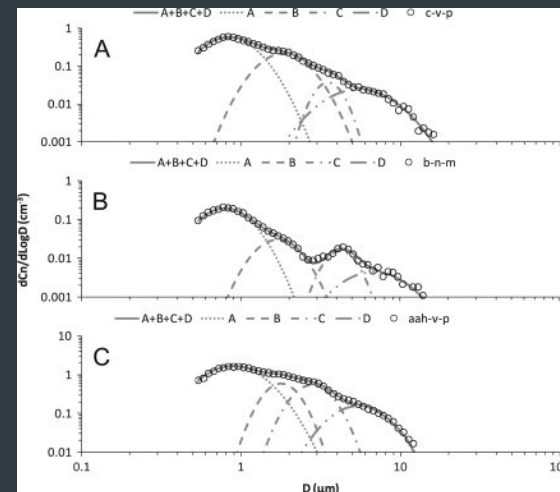




# Infectious Bioaerosols



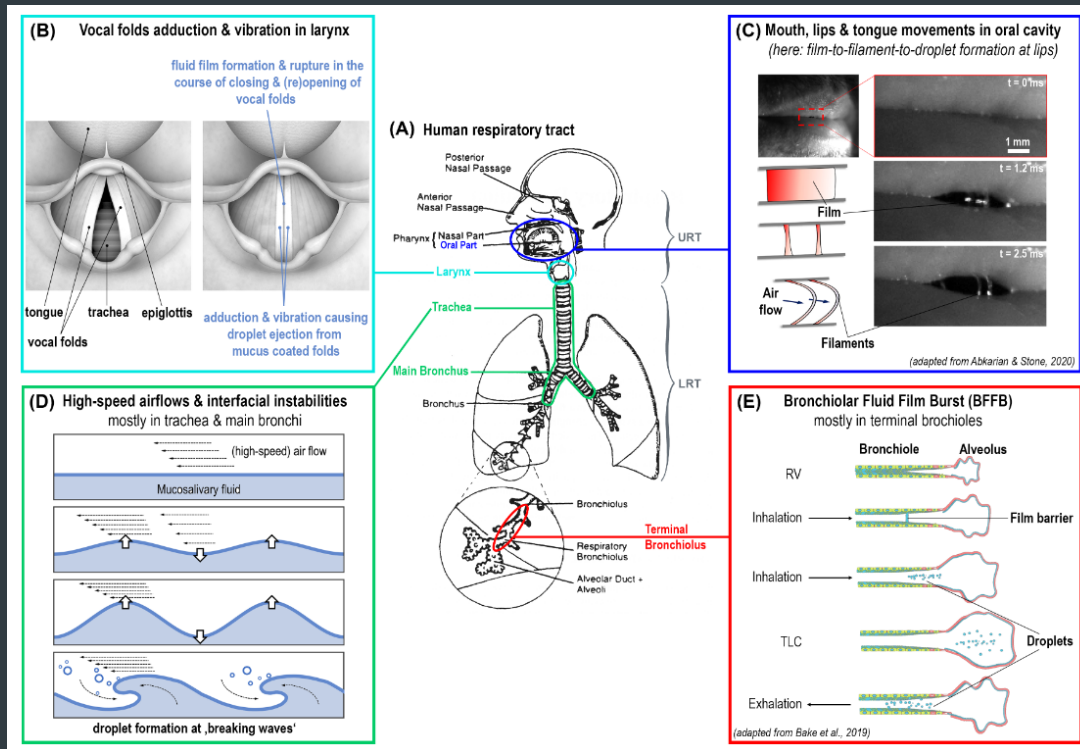
Hinds, 1999



Morawska, et al., 2009

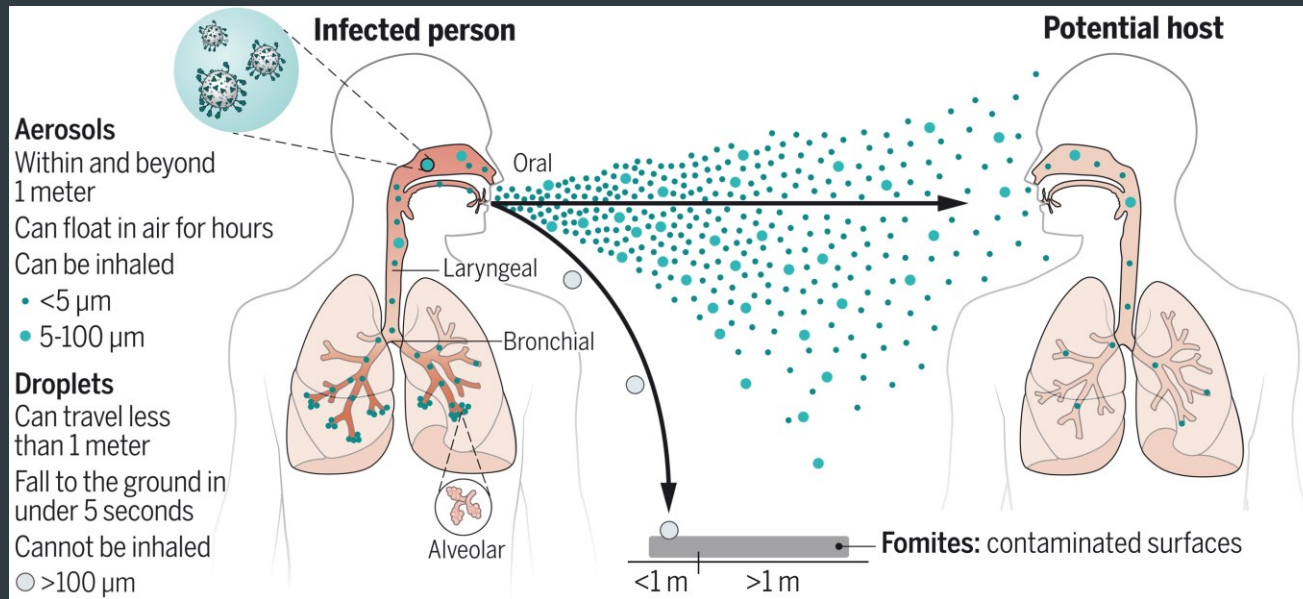
- Infectious Bioaerosols are rarely, if ever, seen as “naked” microorganisms
  - Particle composition and behavior may be dominated by the “matrix”, rather than the organism itself

# Respiratory virus emissions



Pöhlker et al., *Rev. Modern Phys.*, In Review  
<https://arxiv.org/abs/2103.01188v4>

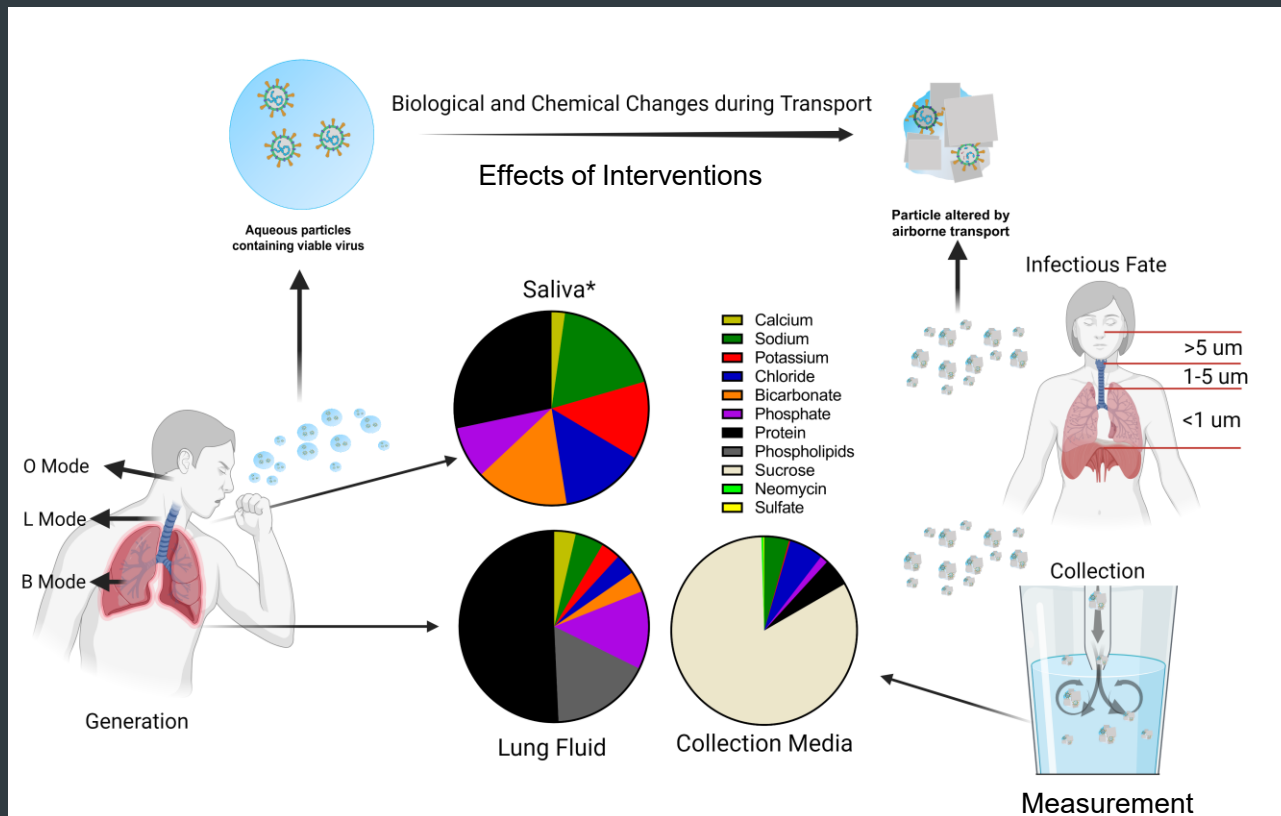
# Aerosols and the spread of disease



Wang et al., 2021

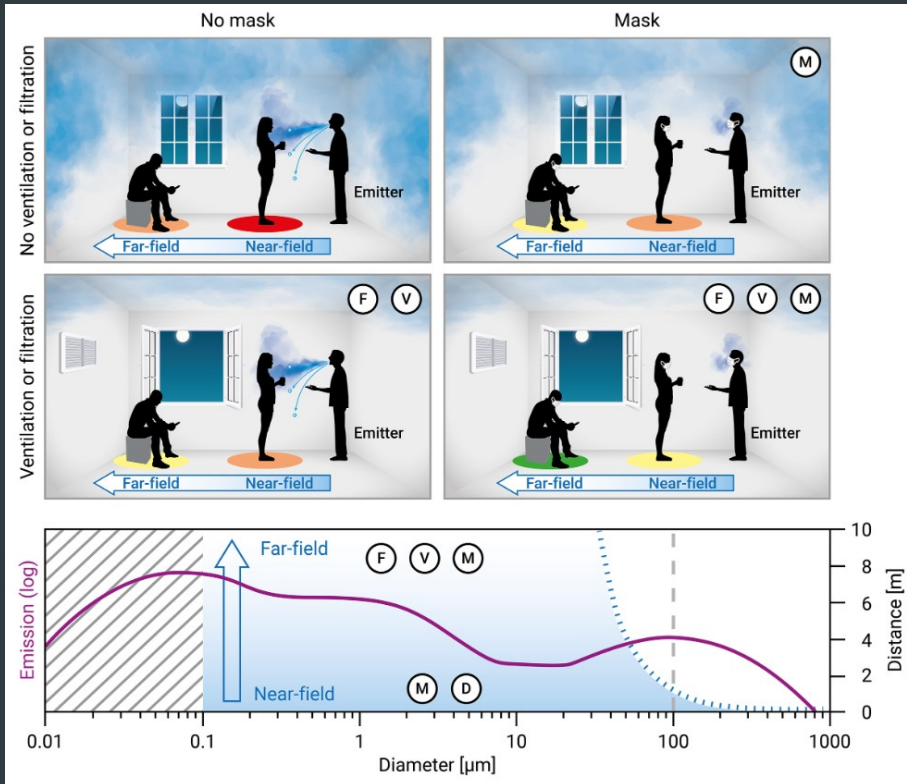


# The Aerobiological Pathway of Infectious Aerosol



Santarpia, et al., 2024

# Viral aerosol risk



## Near-field risk from exhalation plume:

- Direct exposure to inhalation plume
- Masks/PPE critical for exhale/inhale reduction
- Ventilation, filtration minimally effective
- CO<sub>2</sub> monitoring not useful

## Far-field, room-level mixing & build-up:

- Aerosol build-up at room-level
- Masks/PPE critical for exhale/inhale reduction
- Ventilation, filtration very effective
- CO<sub>2</sub> useful as a rough tracer for ventilation

Respiratory aerosols and droplets in the transmission of infectious diseases

Pöhlker et al., *Rev. Modern Phys.*, In Review

<https://arxiv.org/abs/2103.01188v4>

# Situations with highest risk of aerosol exposure

- Indoor, congregate settings where people are talking, singing, etc
  - Cafeterias, lunchrooms
  - Locker rooms
  - Crowded rooms or hallways (especially during shift change or class changes)
- Because humans produce a wide range of aerosol sizes, respiratory emissions can result in both surface and air contamination

Focusing mitigation on highest risk can have advantages



# Mitigation Strategies



# Layered Mitigation Strategies

Preventing indirect transmission of diseases, regardless of route, is best done through layered mitigation

- Individual protection
  - Vaccines, PPE (masks, gloves)
- Removal or Inactivation in the environment
  - Ventilation, filtration, cleaning and disinfection

How much and exactly what is necessary depends on the situation

- Modes of transmission
- Severity of disease
- Individual risk





# Individual Protection

The only form of mitigation that you have complete control over.

- Vaccines
  - Beyond the scope of this talk
- PPE
  - Masks of various kinds
    - When are they useful, which kinds are best
  - Gloves
    - Medical procedures
    - Cleaning and disinfection
  - Face shields/eye protection
    - Likely only necessary during medical procedures
- Hand Hygiene
  - Hand washing can provide both physical removal and inactivation while hand sanitizer only inactivates some agents



# Mask Types and Effectiveness

**Table 1.** Total mass of aerosol expelled into collection chamber and device collection efficiencies.

Device tested	Number of experiments	Fit factor	Aerosol mass ( $\mu\text{g}$ )	Collection efficiency
No device	12	n/a	512 (64)	n/a
Procedure mask	6	2.9 (0.5)	212 (23)	58.5% (6.9%)
Cloth mask	6	1.3 (0.1)	251 (23)	50.9% (7.7%)
Neck gaiter (single layer)	6	1.7 (0.5)	270 (18)	47.2% (7.5%)
Neck gaiter (double layer)	6	1.9 (0.4)	206 (26)	59.8% (7.2%)
Face shield	6	n/a	502 (46)	1.8% (15.3%)
N95 respirator	6	198 (3.5)	7.2 (1.2)	98.6% (0.3%)

Note: The fit factor, aerosol mass, and collection efficiency are given as mean (standard deviation).

Lindsley et al., 2021

Mask Type	% Max penetration (MPPS $\mu\text{m}$ )	Geomean FPF (GSdev)	% Overall Penetration	Inhalation pressure drop (Pa)	Face velocity (cm/s)
Fabric 2-layer masks	91.9 (0.809)	1.78 (1.22)	~56	22.6 to 375.7	4.87
Multi-layer masks	45.2 (0.37)	3.61 (1.57)	~28	31.4 to 60.8	4.87
Disposable procedure masks	26.4 (0.058)	9.73 (1.17)	~10	21.6 to 50.0	4.87
KN95 masks	2.28 (0.123)	144.5 (1.71)	~0.7	37.3 to 67.7	2.01
N95 FFRs	3.41 (0.076)	69.8 (2.23)	~1.4	45.5 to 56.4	1.10 to 6.69

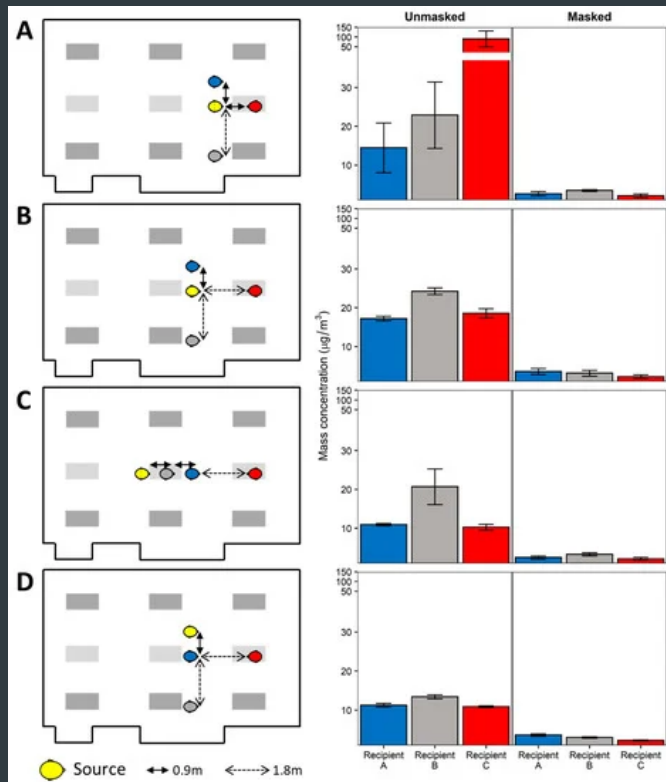
MPPS = Maximum penetrating particle size; Geomean = geometric mean; GSdev = geometric standard deviation.

<https://doi.org/10.1371/journal.pone.0258191.t001>

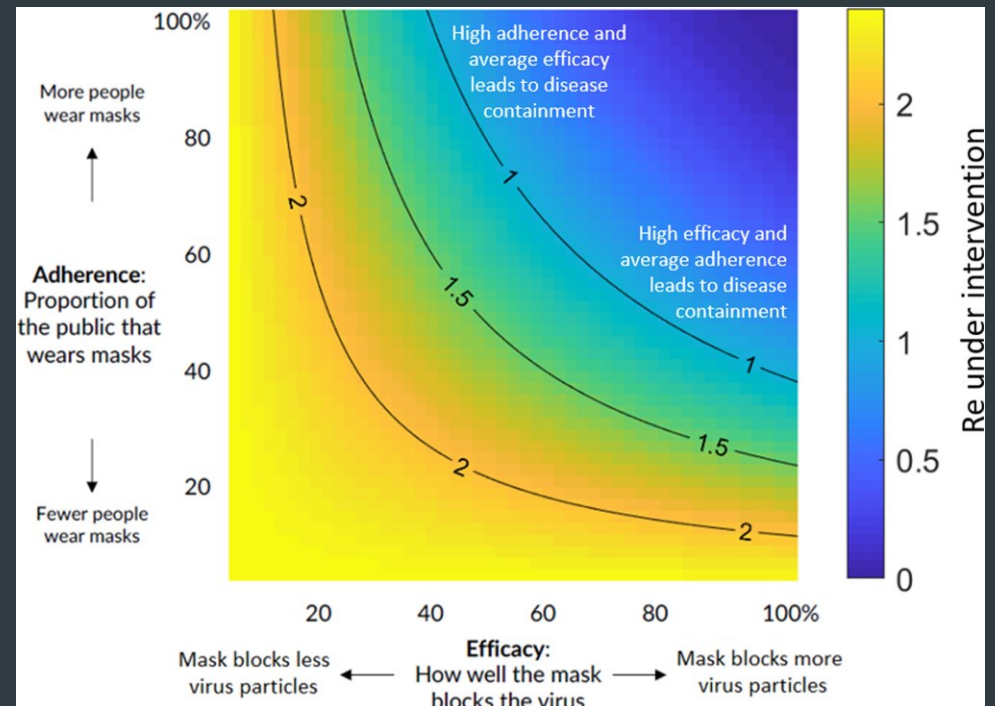
Duncan et al., 2021



# Effectiveness of Mask Wear



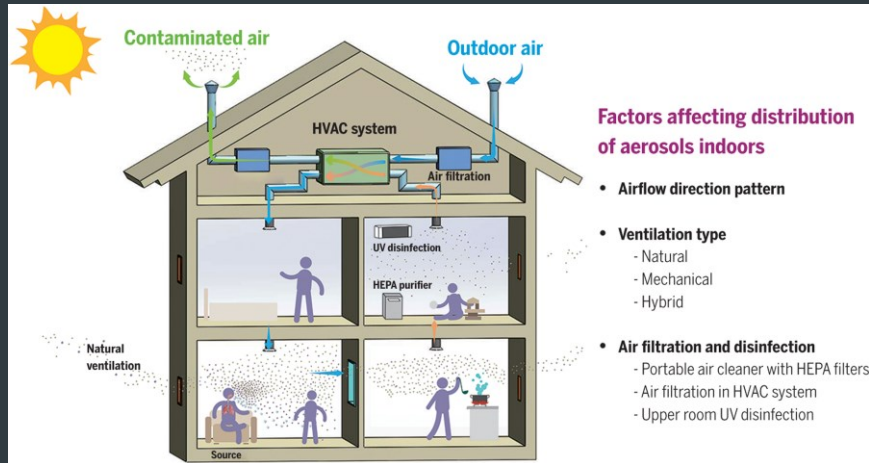
Coyle et al., 2021



Howard et al., 2020



# Pathogen Removal and Inactivation



Wang et al., 2021

TABLE 2. COVID-19 incidence\* and rate ratios in 123 elementary schools,<sup>†</sup> by type of ventilation improvement as a COVID-19 prevention strategy — Georgia, November 16–December 11, 2020

Ventilation improvement	No. (%) of schools	No. of enrolled students	No. of cases <sup>‡</sup>	Cases per 500 students enrolled (95% CI)	RR <sup>§</sup> (95% CI)
Total	123 (100)	66,499	417	3.13 (2.84–3.44)	—
None**	37 (30.1)	21,844	183	4.19 (3.63–4.84)	Ref
Dilution only <sup>††</sup>	39 (31.7)	21,562	127	2.94 (2.48–3.50)	0.65 (0.43–0.98)
Filtration ± purification only <sup>‡‡</sup>	16 (13.0)	9,133	45	2.46 (1.84–3.29)	0.69 (0.40–1.21)
Dilution and filtration ± purification <sup>§§</sup>	31 (25.2)	13,960	62	2.22 (1.73–2.84)	0.52 (0.32–0.83)

**Abbreviations:** CI = confidence interval; GPDH = Georgia Department of Public Health; HEPA = high-efficiency particulate absorbing; RR = rate ratio; UVGI = ultraviolet germicidal irradiation; ± = with or without.

\* Case incidence in schools was calculated as the sum of cases reported to GPDH during November 16–December 11, 2020, divided by the number of students enrolled multiplied by 500.

<sup>†</sup> Excludes schools from the original 169 that reported “Don’t know” to improving ventilation (n = 45) and one school that reported only using an air purification strategy. Number includes both students and staff members with a case of COVID-19 during the study period.

<sup>‡</sup> Adjusted for county-level 7-day case incidence per 100,000 population on December 1, 2020.

<sup>§</sup> Includes schools that reported “No” to improving ventilation and six schools that reported decreasing room occupancy as the only ventilation improvement.

<sup>††</sup> Opening doors, opening windows, or using fans.

<sup>‡‡</sup> Using HEPA filters with or without using UVGI and not opening doors, opening windows, or using fans.








<sup>§§</sup> Opening doors, opening windows, or using fans, and using HEPA filters with or without using UVGI.

Gettings et al., 2021



# Ventilation

- A dominant factor in aerosol removal in indoor spaces is building ventilation
  - Natural
  - Mechanical
- In general, mechanical ventilation is expressed in air changes per hour (ACH)
  - The number of times in one hour the entire volume of air is replaced
- Effective ACH (eACH) is a measure of how rapidly particles are removed from a space
  - Only an estimate of ACH
  - Accounts for natural ventilation and other mitigations
  - More directly represents safety from particulate hazards (infectious particles)
- CO<sub>2</sub> monitoring indicates fresh air exchange
  - Only an indicator of ventilation

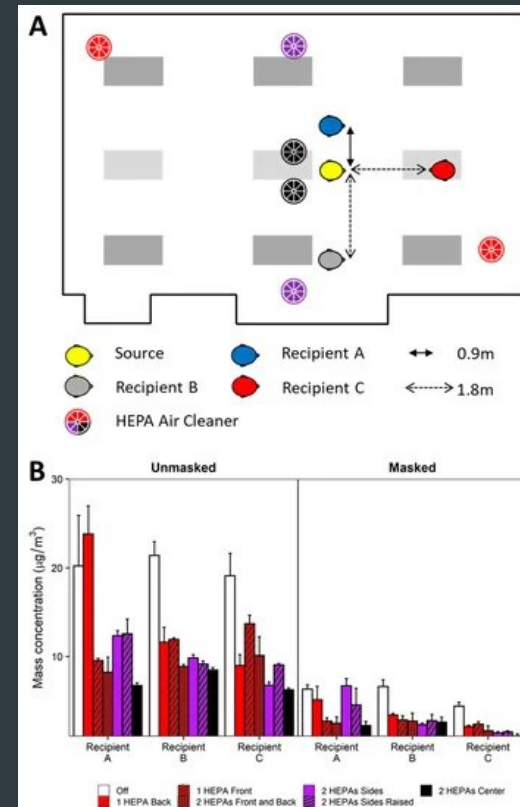
Location Type	Suggested Outdoor Air Ventilation Rate (air changes per hour)
 Homes	0.35–1
 Hotel Rooms	1–2
 Offices	2–3
 Retail Shops	2–3
 Schools (except lecture halls)	5–6
 Sports Facilities	4–8
 Restaurants	6–8

Hospital Area	Minimum Outdoor ACH	Minimum Total ACH
Critical and Intensive Care	2	6
Airborne Infection Isolation Room	2	12
Examination Room	2	6



# Portable HEPA Filters

- Very effective in augmenting existing ventilation
- Removes infectious particles
- Multiple units needed for large spaces
- Placement impacts effectiveness

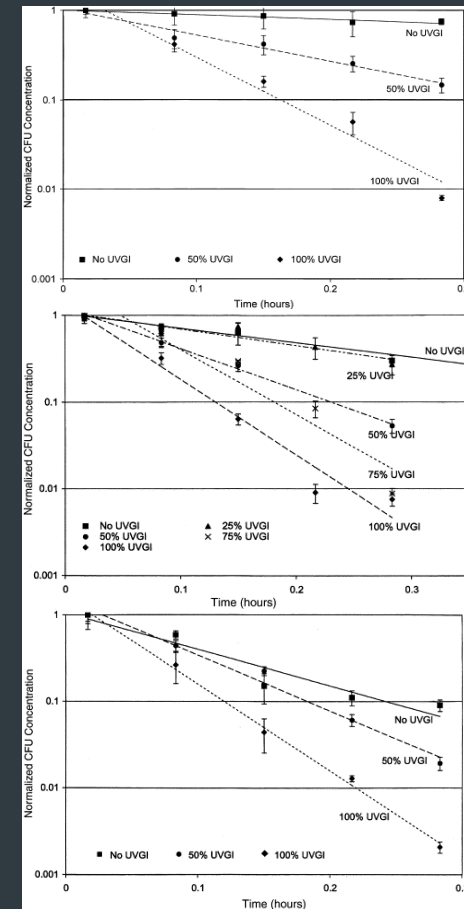


Coyle et al., 2021



# Upper Room Ultraviolet Germicidal Irradiation

- Uses ultraviolet radiation to inactivate microbial aerosols
- Does not illuminate entire room, just upper part
- Relies on room ventilation to circulate particles
- Demonstrated to be effective against a range of bacteria and viruses



Xu et al., 2003

0 ACH

3 ACH

6 ACH



# Other Options

- Ionization and ozone-based systems
  - Limited independent data on effectiveness as designed
  - Ozone can be produced by both systems
    - Can react with other gasses to form hazardous particulates
    - Ozone can damage lung cells
- There are many technologies currently under investigation
  - Trace chlorine dioxide
  - Deep, eye-safe, UV
  - Etc



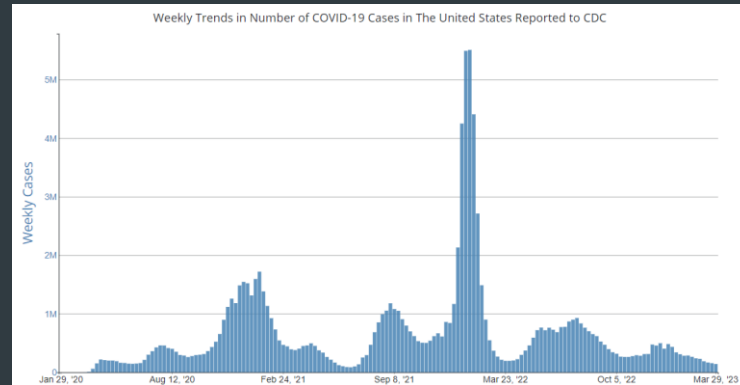


# Monitoring

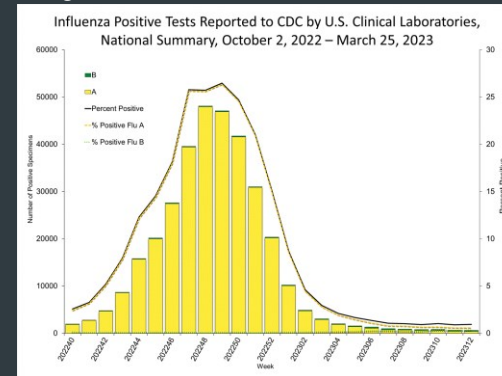


# Human Surveillance

- Most common means of monitoring transmission rates for disease
- Determine seasonal trends
- Identify variant/strain
- Identify periods when enhanced mitigation is warranted



<https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html>

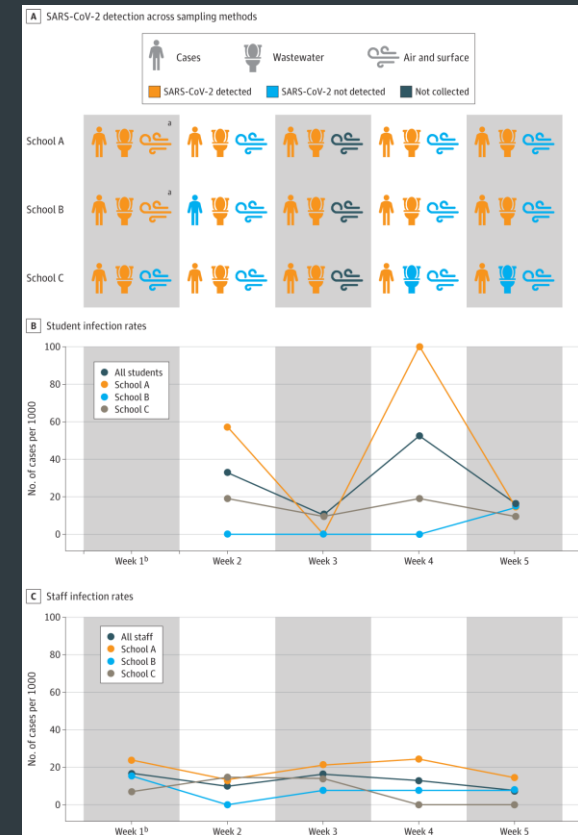


<https://www.cdc.gov/flu/weekly/index.htm>



# Wastewater Monitoring

- Work in Omaha Public Schools indicated wastewater monitoring for SARS-CoV-2 was generally consistent with the detection of SARS-CoV-2 infections by saliva testing at approximately a tenth of the cost of universal human testing
- Wastewater monitoring may ultimately provide cost-effective, building-level surveillance to identify transmission hotspots and prioritize more resource-intensive individual screening
- Can identify presence and prevalence of disease independent of symptomatic people
- Determine if cases are increasing or decreasing
- Has been shown to be predictive of large outbreaks, in some cases (Hellmér et al., 2014)

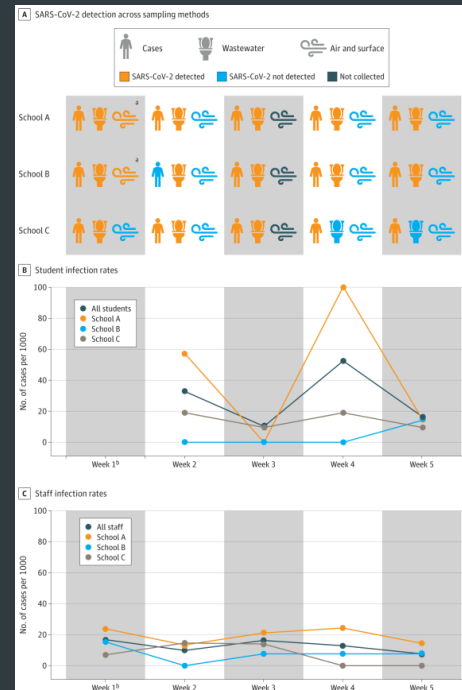


Crowe et al., 2021



# Air Monitoring

- Air and surface sampling can assist in the evaluation of activity-specific transmission risk and inform risk mitigation measures, including activity modifications and enhanced hygiene protocols.
  - Detection in choir classrooms
  - Unpublished data from meatpacking indicate exposure to human generated particles is greatest in indoor congregate areas where masking is limited



Crowe et al., 2021

Parameter	SARS-CoV-2 /COVID-19 (+/-)			Respiratory Surfactant (+/-)			% +
	1	2	3	1	2	3	
Fabrication Cafeteria	0/2	0/2	0/2	0/4	0/2	1/2	34%
Kill Cafeteria	0/2	0/2	0/2	1/4	1/2	0/2	
Food Court	0/1	0/1	0/1	0/1	0/1	0/1	
Main Entryway	NR	0/1	0/1	NR	1/1	1/1	
Main Hallway	NR	0/1	0/1	NR	1/1	1/1	
Fabrication Men's Locker	NR	0/1	0/1	NR	1/1	0/1	
Fabrication Women's Locker	NR	0/1	0/1	NR	0/1	1/1	
Kill Men's Locker	NR	0/1	0/1	NR	1/1	0/1	18%
Fabrication Processing Areas	0/5	0/1 0	0/1 0	1/5	2/1 0	2/1 0	
Kill Processing Areas	0/7	1/9	0/8	3/7	1/9	0/7	

Santarpia, unpublished



# Summary

- Aerosols that carry infectious disease can cover a wide size range
  - Can travel long distances and be deposited on surfaces
  - Important to many diseases
- Mitigation strategies range from building level to individual protections
  - A variety of different mitigations can be implemented to achieve goals
- Wastewater and human surveillance can inform disease transmission and guide implementation of enhanced mitigation strategies
- Air sampling can inform situational risk



# References and Resources



# References

1. Coyle, J. P., Derk, R. C., Lindsley, W. G., Blachere, F. M., Boots, T., Lemons, A. R., ... & Noti, J. D. (2021). Efficacy of ventilation, HEPA air cleaners, universal masking, and physical distancing for reducing exposure to simulated exhaled aerosols in a meeting room. *Viruses*, 13(12), 2536.
2. Crowe, J., Schnaubelt, A. T., SchmidtBonne, S., Angell, K., Bai, J., Eske, T., ... & Broadhurst, M. J. (2021). Assessment of a program for SARS-CoV-2 screening and environmental monitoring in an urban public school district. *JAMA network open*, 4(9), e2126447-e2126447.
3. Duncan, S., Bodurtha, P., & Naqvi, S. (2021). The protective performance of reusable cloth face masks, disposable procedure masks, KN95 masks and N95 respirators: Filtration and total inward leakage. *PloS one*, 16(10), e0258191.
4. Gettings, J., Czarnik, M., Morris, E., Haller, E., Thompson-Paul, A. M., Rasberry, C., ... & MacKellar, D. (2021). Mask use and ventilation improvements to reduce COVID-19 incidence in elementary schools—Georgia, November 16–December 11, 2020. *Morbidity and Mortality Weekly Report*, 70(21), 779.
5. Hellmér, M., Paxéus, N., Magnius, L., Enache, L., Arnholm, B., Johansson, A., ... & Norder, H. (2014). Detection of pathogenic viruses in sewage provided early warnings of hepatitis A virus and norovirus outbreaks. *Applied and environmental microbiology*, 80(21), 6771-6781.
6. Hinds, W. C. (1999). *Aerosol technology: properties, behavior, and measurement of airborne particles*. John Wiley & Sons.
7. Howard, J., Huang, A., Li, Z., Tufekci, Z., Zdimal, V., Van Der Westhuizen, H. M., ... & Rimoin, A. W. (2021). An evidence review of face masks against COVID-19. *Proceedings of the National Academy of Sciences*, 118(4), e2014564118.
8. Lindsley, W. G., Blachere, F. M., Law, B. F., Beezhold, D. H., & Noti, J. D. (2021). Efficacy of face masks, neck gaiters and face shields for reducing the expulsion of simulated cough-generated aerosols. *Aerosol Science and Technology*, 55(4), 449-457.
9. Morawska, L. J. G. R., Johnson, G. R., Ristovski, Z. D., Hargreaves, M., Mengersen, K., Corbett, S., ... & Katoshevski, D. (2009). Size distribution and sites of origin of droplets expelled from the human respiratory tract during expiratory activities. *Journal of aerosol science*, 40(3), 256-269.
10. Wang, C. C., Prather, K. A., Sznitman, J., Jimenez, J. L., Lakdawala, S. S., Tufekci, Z., & Marr, L. C. (2021). Airborne transmission of respiratory viruses. *Science*, 373(6558), eabd9149.
11. Xu, P., Peccia, J., Fabian, P., Martyny, J. W., Fennelly, K. P., Hernandez, M., & Miller, S. L. (2003). Efficacy of ultraviolet germicidal irradiation of upper-room air in inactivating airborne bacterial spores and mycobacteria in full-scale studies. *Atmospheric Environment*, 37(3), 405-419.
12. Santarpia, J.L., Reid, J.P., Wu, C.-Y., Lednický, J.A., Oswin, H.P. 2024. The aerobiological pathway of natural respiratory viral aerosols. *Trends in Analytical Chemistry*, 172, <https://doi.org/10.1016/j.trac.2024.117557>.



# Resources

Building Ventilation Standards

[https://www.ashrae.org/File%20Library/Technical%20Resources/Standards%20and%20Guidelines/Standards%20Addenda/62-2001/62-2001\\_Addendum-n.pdf](https://www.ashrae.org/File%20Library/Technical%20Resources/Standards%20and%20Guidelines/Standards%20Addenda/62-2001/62-2001_Addendum-n.pdf)

Building Ventilation for Disease Prevention

<https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>

COVID-19 in Nebraska

<https://dhhs.ne.gov/Pages/Coronavirus.aspx>

COVID-19 U.S.

<https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html>

Influenza U.S.

<https://www.cdc.gov/flu/weekly/index.htm>







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# Questions and Answer Session

Use the QA box in the webinar platform to type a question. Questions will be read aloud by the moderator.

Guest Speaker: Dr. Rick Starlin

josh.santarpia@unmc.edu

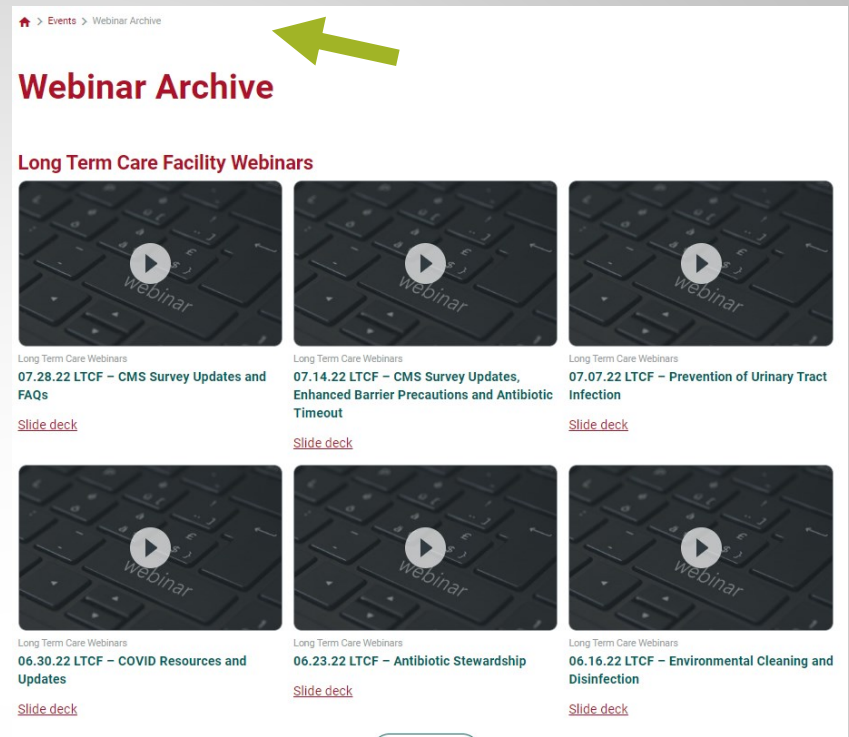
## Panelists:

- Dr. Salman Ashraf, MBBS
- Kate Tyner, RN, BSN, CIC
- Josette McConville, RN, BSN, CIC
- Lacey Pavlovsky, RN, MSN, CIC
- Rebecca Martinez, BA, BSN, RN, CIC
- Jody Scebold, EdD, MSN, RN
- Sarah Stream, MPH, CDA, FADAA
- Daniel Taylor, DHHS
- Deanna Novak, DHHS
- Becky Wisell, DHHS
- Cindy Kadavy, NHCA
- Kierstin Reed, LeadingAge
- Melody Malone, PT, CPHQ, MHA
- Debi Majo, BSN, RN
- Carla Smith, RN, CDP, IP-BC, AS-BC
- Monika Maxwell, RN

Moderated by Marissa Chaney

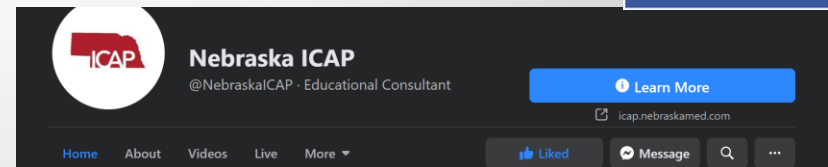
Supported by Margaret Deacy

Slide support from Josette McConville, RN, BSN, CIC



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# ICAP Updates and Information



# Paxlovid PAXCESS™

## Patient Support Program

### WHAT INFORMATION IS REQUIRED TO ENROLL?

1. Prescription for PAXLOVID
2. Patient demographics: Name, DOB, address
3. Prescriber information: Prescriber name, city, state, ZIP code
4. Insurance information: Commercial, Medicare, Medicaid, uninsured, or unknown

[Paxlovid PAXCESS-  
Pharmacist-  
Brochure.pdf  
\(nebraskamed.com\)](#)

### HOW LONG DOES IT TAKE?

- Enrollment takes about 5 minutes
  - Co-pay card (Commercial insurance)
  - Voucher (Medicare, Medicaid, and uninsured patients)

[Pharmacy  
Treatment  
Locator  
\(hhs.gov\)](#)

### WHO CAN ENROLL THE PATIENT?

- Patients can self-enroll
- A caregiver or HCP can enroll the patient
- A pharmacist can enroll the patient

# SAVE THE DATE!

## 2024 Nebraska Antimicrobial Stewardship Summit

*Smart Antibiotic Choices, Stronger Future*

**Friday, May 31, 2024 | 7:30 am – 3:30 pm**

Embassy Suites LaVista Hotel & Conference Center

*Registration information to follow*



**Poster Session - New this year! Visit the Nebraska ASAP Website to Learn More!**

[Click Here: Nebraska Antimicrobial Stewardship Summit - ASAP \(nebraskamed.com\)](https://nebraskamed.com)

Registration is OPEN!

Join us for the NE Infection Control Network (NICN)

Primary Infection Prevention Course

Wednesday & Thursday, March 13 & 14, 2024

UNMC College of Nursing Building, 4111 Dewey, Omaha, NE

For more information, scan code or visit  
our website:



[https://icap.nebraskamed.com/the-  
event/nicn-primary-infection-  
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NE Infection  
Control Network





# Webinar CE Process

**1 Nursing Contact Hour and 1 NAB Contact Hour is offered for attending this LIVE webinar.**

**Individual surveys must be completed for each attendee.**

Questions? Contact Marissa at:

[Machaney@nebraskamed.com](mailto:Machaney@nebraskamed.com) 402-552-2881

## **NAB:**

- Completion of survey is required.
  - The survey must be specific to the individual obtaining credit. (i.e.: 2 people cannot be listed on the same survey)
- **You must have a NAB membership**
- Credit is retrieved by you
- Any issues or questions regarding your credit must be directed to NAB customer service.
  - ICAP can verify survey completion and check the roster list
- Due to NAB changes, attendance will be submitted quarterly. ICAP will send an email stating when credits are ready for retrieval.

## **Nursing Contact Hours:**

- Completion of survey is required.
  - The survey must be specific to the individual obtaining credit. (i.e.: 2 people cannot be listed on the same survey)
- One certificate is issued quarterly for all webinars attended
- Certificate comes directly from ICAP via email

# Infection Prevention and Control Hotline Number:

**Call 402-552-2881**

**Office Hours** are Monday – Friday

8:00 AM - 4:00 PM Central Time

**On-call hours are available for emergencies only**

Weekends and Holidays from 8:00 AM- 4:00 PM

\*Messages left outside of Office or On-call hours will be answered the next business day.

\*\*Please call the main hotline number to ensure the quickest response.



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