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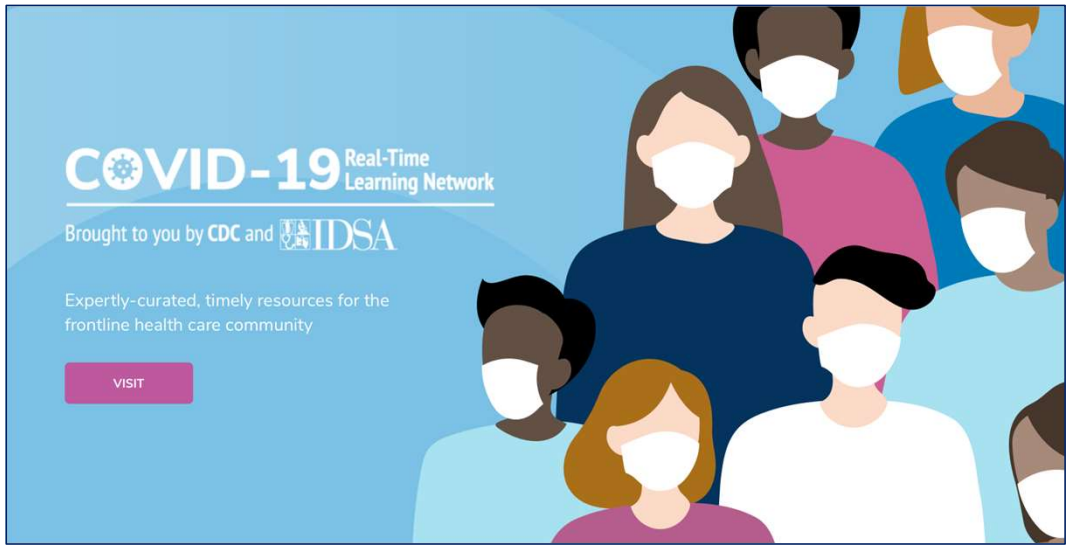

Specialty Society Collaborators:

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- 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.

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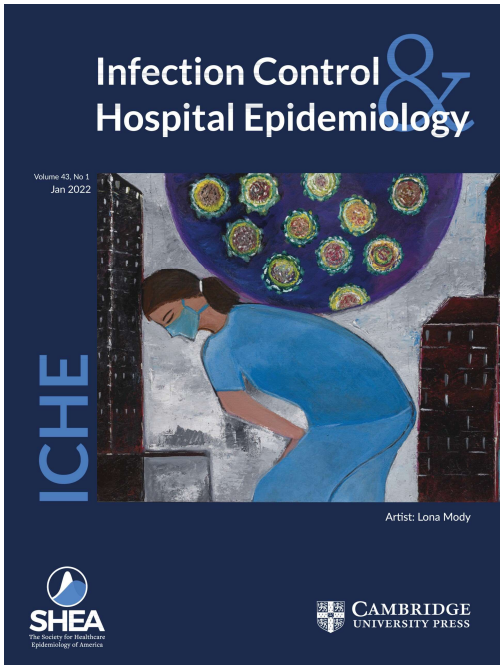

Infection Control & Hospital Epidemiology publishes scientifically authoritative, clinically applicable, peer-reviewed research on control and evaluation of the transmission of pathogens in healthcare institutions and on the use of epidemiological principles and methods to evaluate and improve the delivery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

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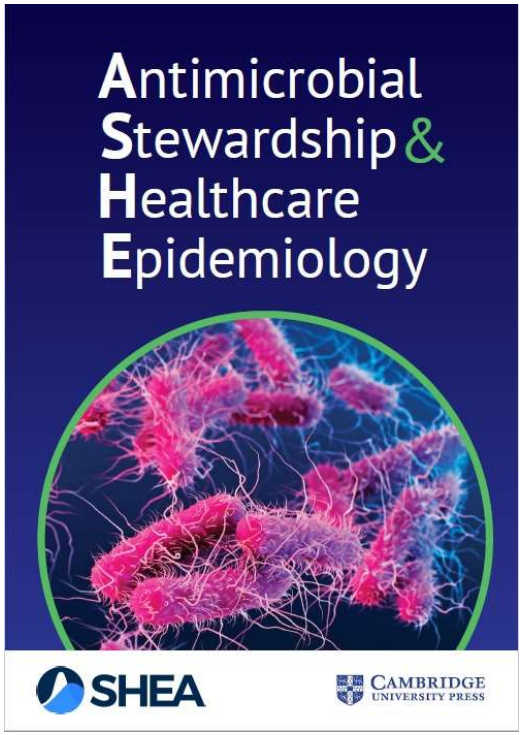

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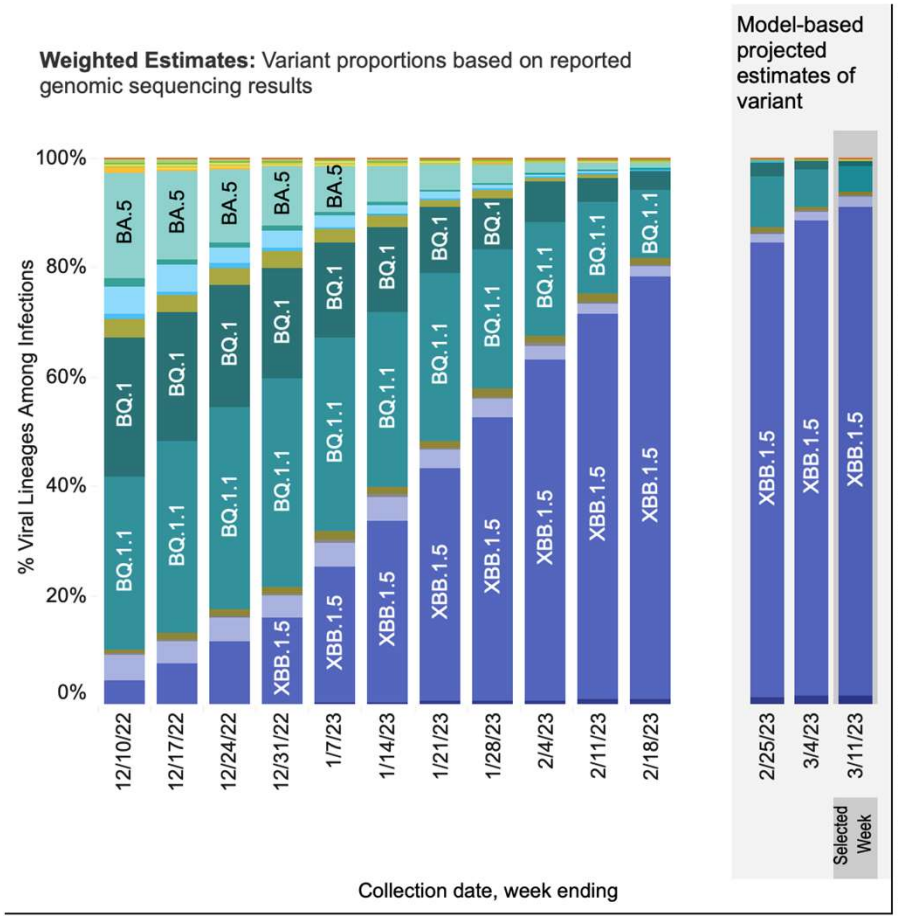
SHEA Town Hall 85
Overview

SARS-CoV-2 VARIANTS, US, CDC

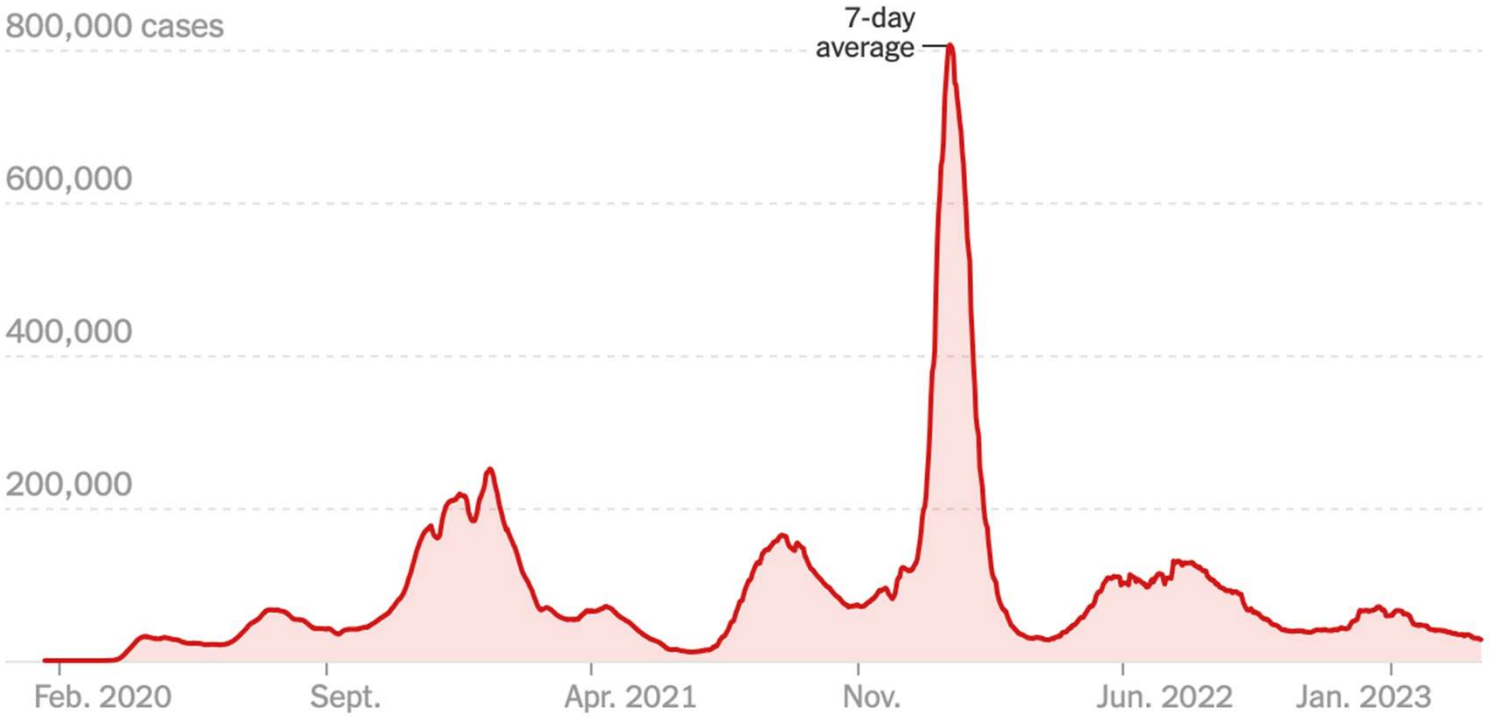


WHO label	Lineage #	US Class	%Total	95%PI
Omicron	XBB.1.5	VOC	89.5%	85.8-92.3%
	BQ.1.1	VOC	4.7%	3.3-6.8%
	XBB	VOC	2.1%	1.1-3.9%
	XBB.1.5.1	VOC	1.6%	1.0-2.4%
	BQ.1	VOC	1.0%	0.7-1.5%
	CH.1.1	VOC	0.7%	0.4-1.0%
	BN.1	VOC	0.1%	0.1-0.2%
	BA.2	VOC	0.1%	0.0-1.1%
	BA.5	VOC	0.1%	0.0-0.1%
	BF.7	VOC	0.0%	0.0-0.1%
	BA.5.2.6	VOC	0.0%	0.0-0.0%
	BA.2.75	VOC	0.0%	0.0-0.0%
	BF.11	VOC	0.0%	0.0-0.0%
	BA.2.75.2	VOC	0.0%	0.0-0.0%
	B.1.1.529	VOC	0.0%	0.0-0.0%
	BA.4.6	VOC	0.0%	0.0-0.0%
	BA.2.12.1	VOC	0.0%	0.0-0.0%
	BA.4	VOC	0.0%	0.0-0.0%
	BA.1.1	VOC	0.0%	0.0-0.0%
Delta	B.1.617.2	VBM	0.0%	0.0-0.0%
Other	Other*		0.1%	0.0-0.1%

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

REPORTED COVID-19 CASES IN THE UNITED STATES

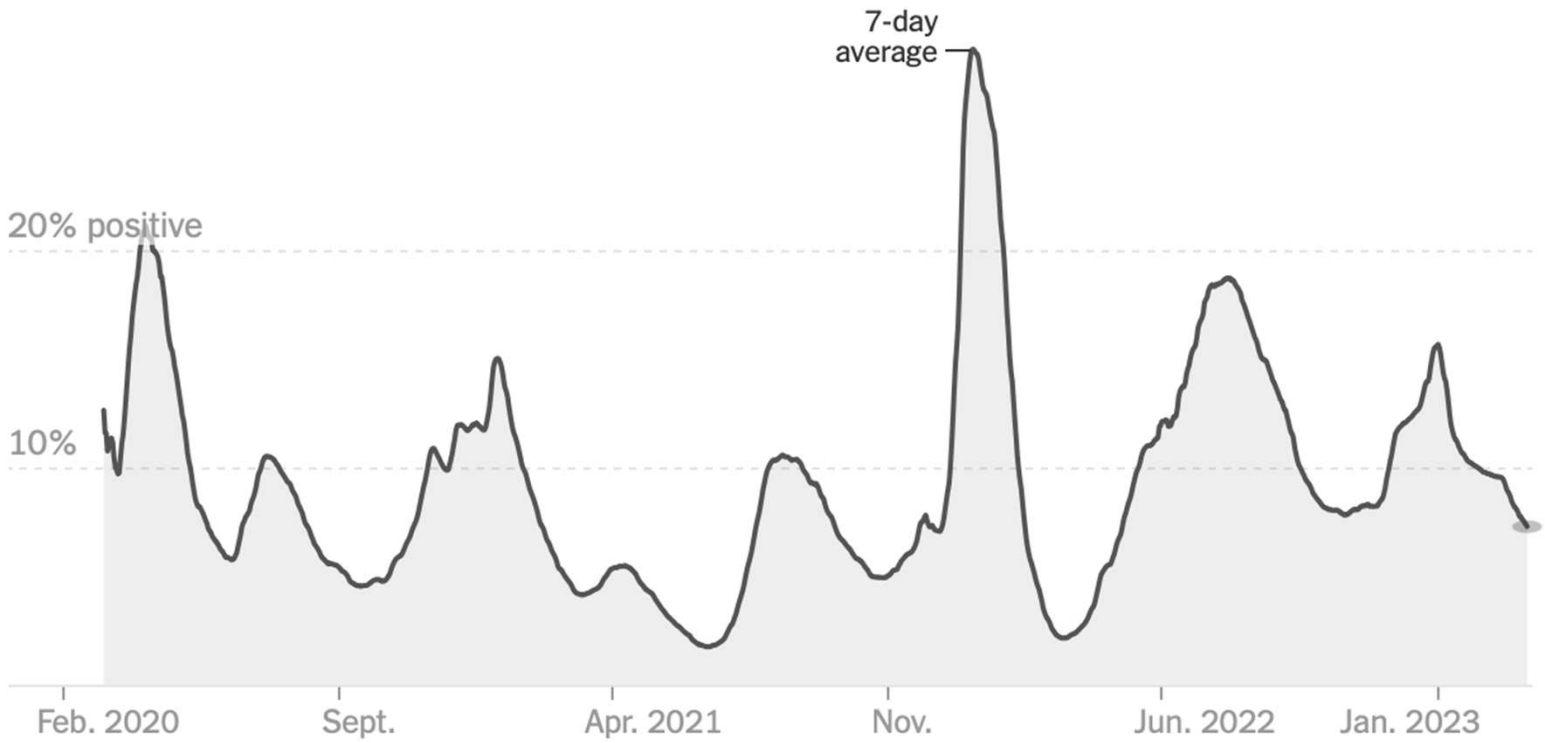
Cumulative Cases – 102,845,187



Cases decreased by 32% from two weeks earlier

Sources: New York Times 3-16-2023

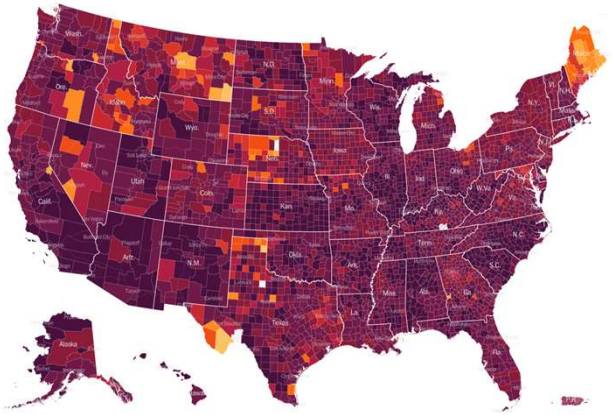
COVID-19 TEST POSITIVITY IN THE UNITED STATES



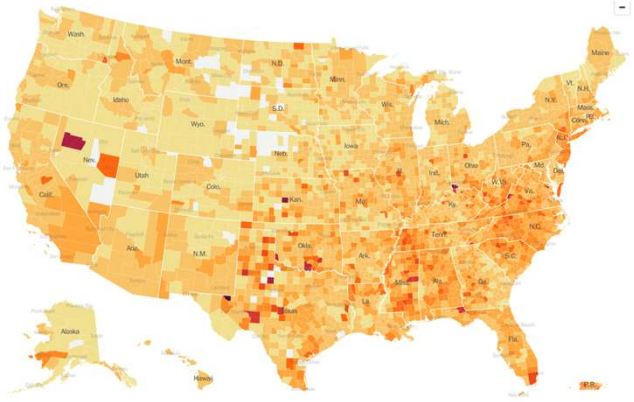
Test Positivity decreased by 15% from two weeks earlier

Source: New York Times 3-16-2023

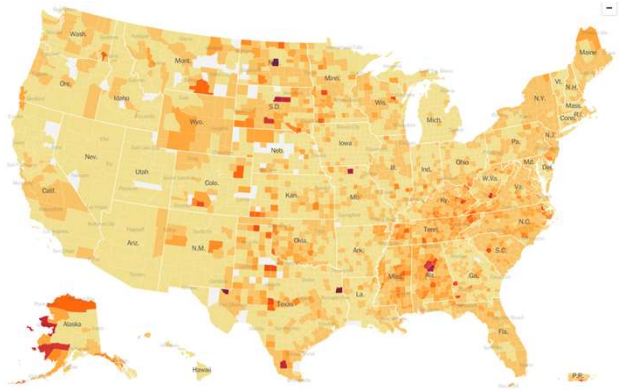
US COVID-19 HOTSPOTS



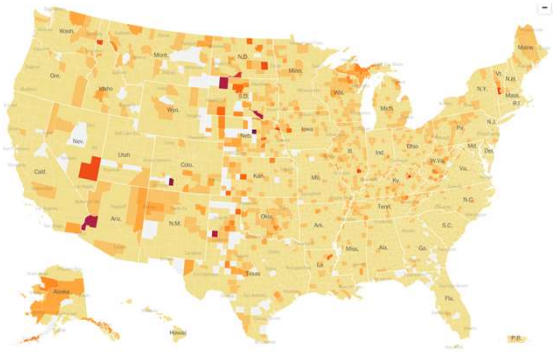
February 6, 2022



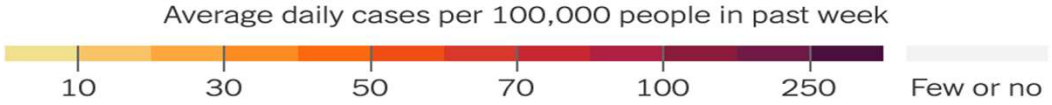
January 8, 2023



February 12, 2022

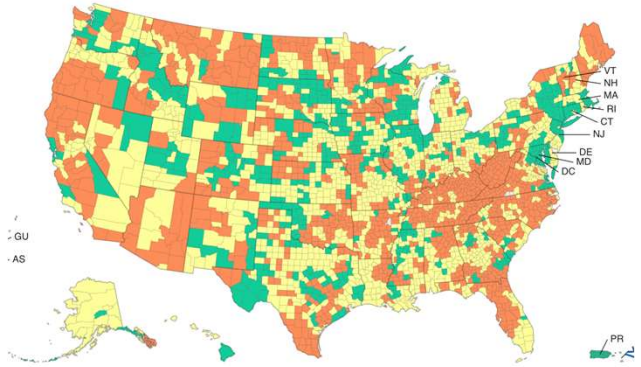


March 17, 2023



Source: New York Times 3-17-2023

CDC COVID-19 COMMUNITY LEVELS



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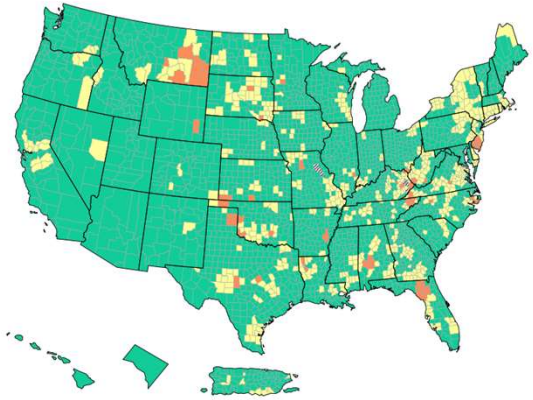
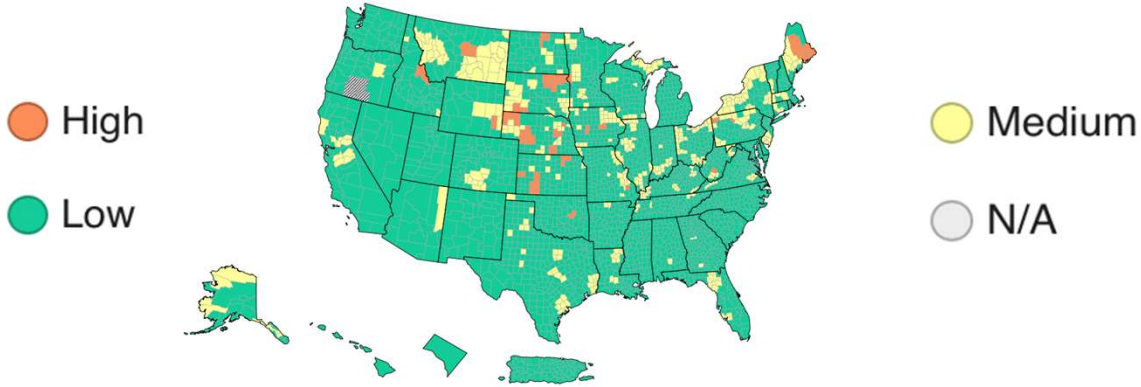


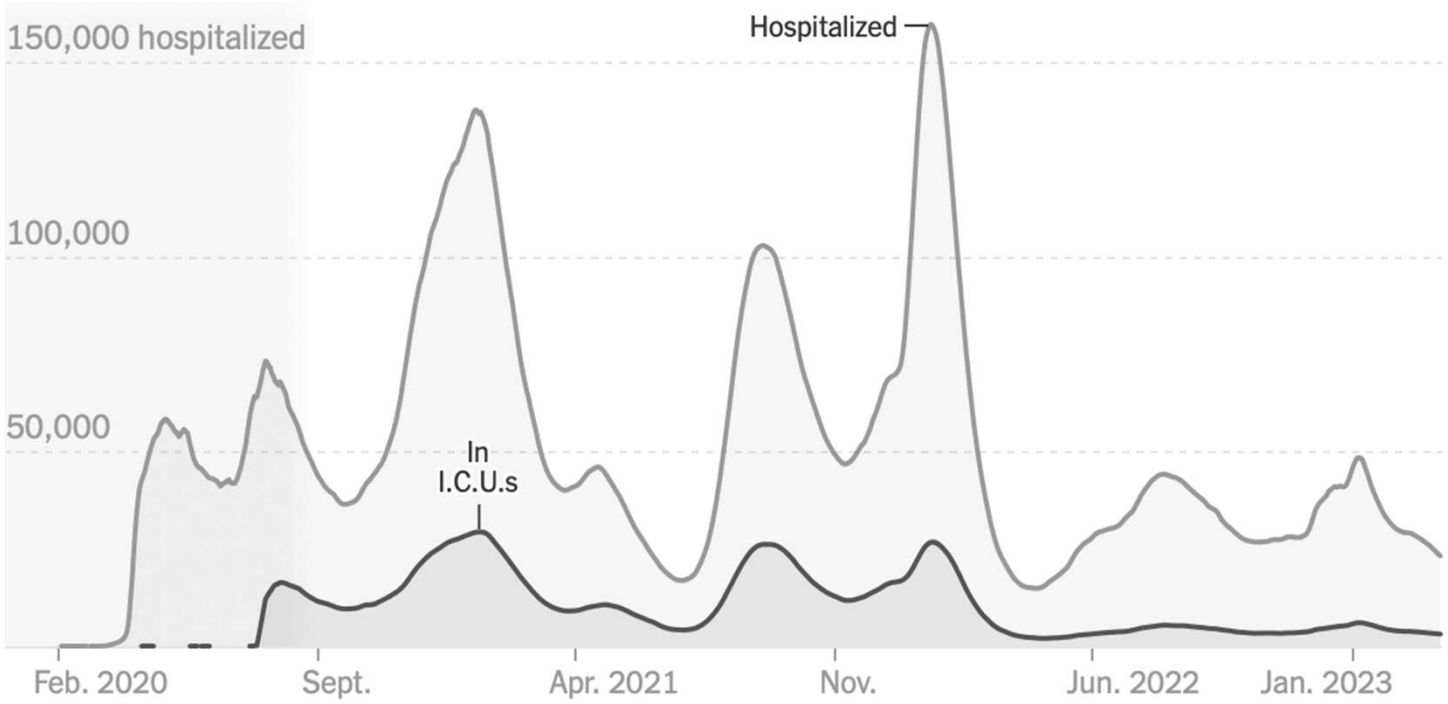
February 12, 2023



March 17, 2023

Source – https://covid.cdc.gov/covid-data-tracker/#county-view?list_select_state=all_states&list_select_county=all_counties&data-type=CommunityLevels&null=CommunityLevels

HOSPITALIZATIONS AND ICU ADMISSIONS FOR COVID-19 IN THE UNITED STATES



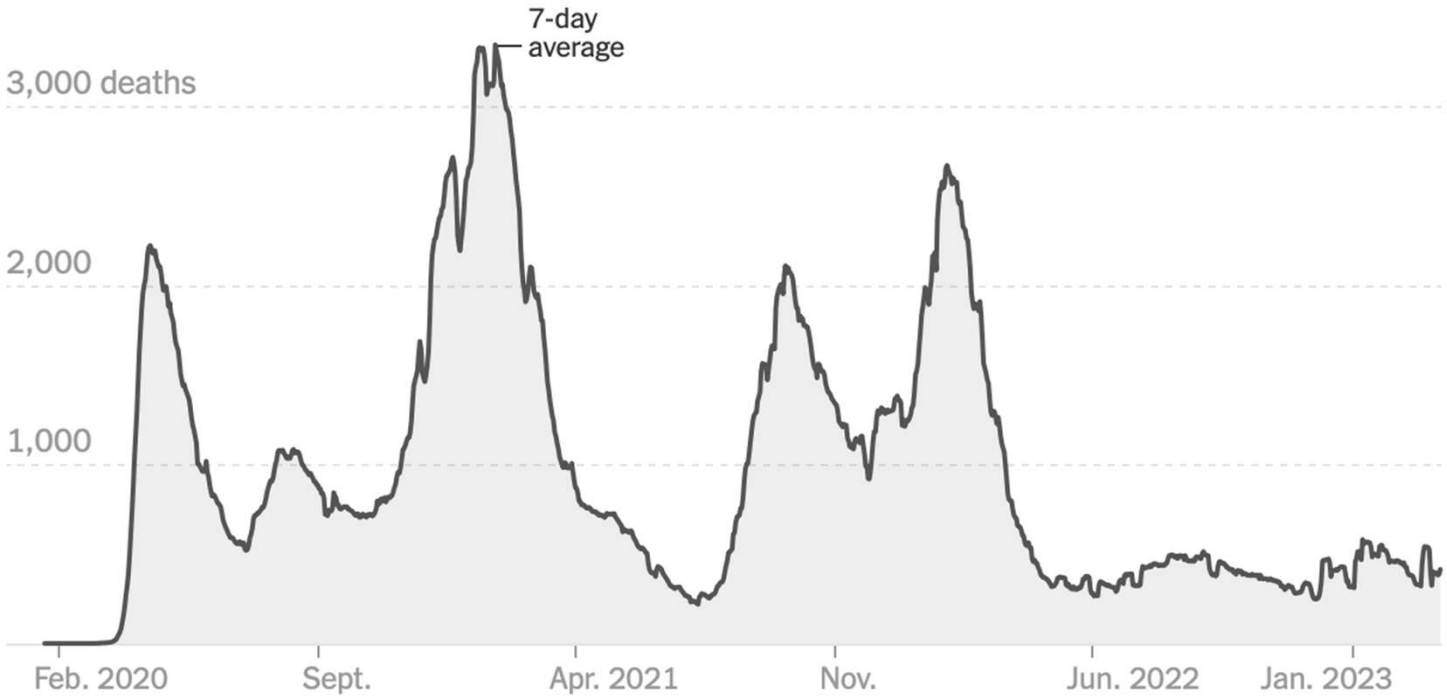
Hospitalizations decreased 15% from two weeks earlier

ICU hospitalizations decreased 12% from two weeks earlier

Source: New York Times 3-17-23

COVID-19 Deaths in the United States

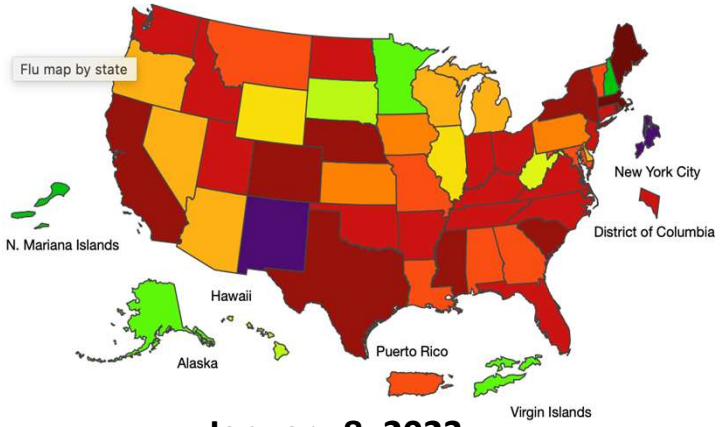
Cumulative Deaths – 1.119.762



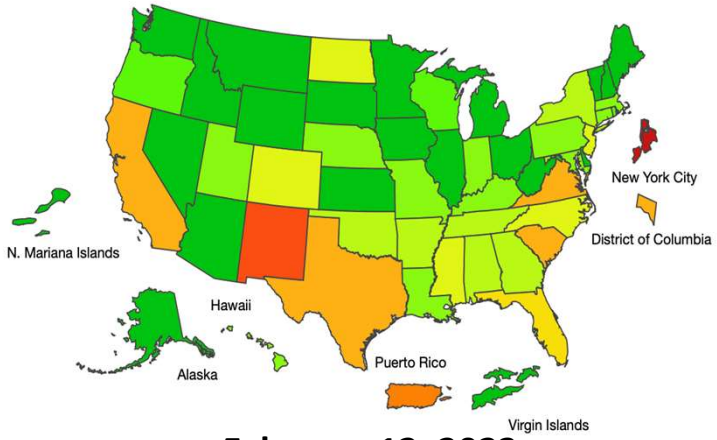
38% decrease from two weeks earlier

Sources: New York Times 2-12-23,; CDC COVID Data Tracker
https://covid.cdc.gov/covid-data-tracker/#datatracker-home 3-17-23

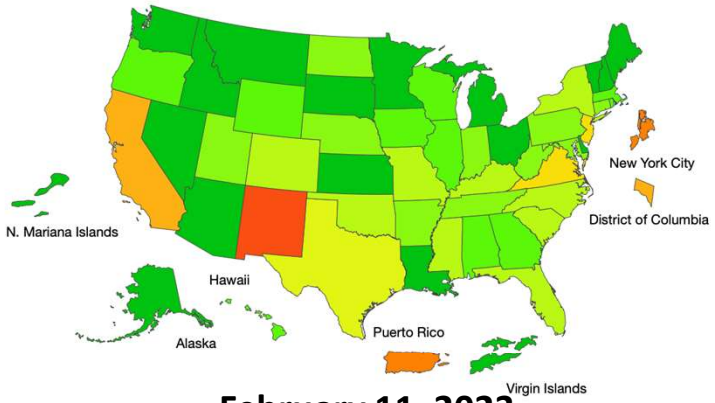
INFLUENZA ACTIVITY BY STATE IN THE UNITED STATES



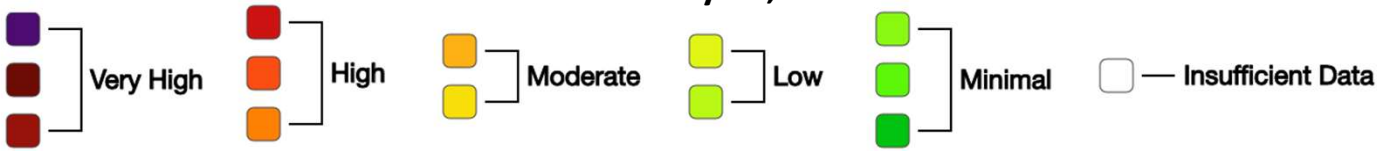
January 8, 2023



February 12, 2023



February 11, 2023



Source: CDC https://www.cdc.gov/flu/weekly/usmap.ntm 3-17-23

This Week's Emerging Infectious Disease News

1. *A study in the **JAMA Network Open** found that 25% of parents misrepresent COVID-19 public health measures to their children .*
2. *Another **JAMA Network Open** study found that prior COVID-19 infection during the BA.1 and BA.2 periods was associated with greater protection from re-infection during BA.5 predominance; also, the 4-dose booster, irrespective of history of infection, was associated with higher protection against BA.5 .*
3. *A third **JAMA Network Open** study found among Canadian children that the Omicron and Delta variants were more strongly associated with fever, cough, lower respiratory tract, and systemic symptoms than the original-type and Alpha viruses; however, hospitalization and intensive care admission rates were comparable .*
4. *A **JAMA** randomized clinical trial evaluated administration of high-dose Ivermectin for outpatients with COVID and found no effect of the drug..*
5. *A **JAMA Pediatrics** paper found that postpartum maternal COVID-19 vaccination was moderately effective against Delta infection in infants younger than 6 months but not against Omicron ands suggested that postpartum maternal vaccination may be inferior to vaccination during pregnancy, particularly against Omicron .*
6. *A **New England Journal** paper found that a three-dose primary series of 3-µg BNT162b2 was safe, immunogenic, and efficacious in children 6 months to 4 years of age .*
7. *A paper published in **The Lancet** found in a large cohort study of Kaiser patients, clear efficacy of Paxlovid in preventing hospital admission and death from COVID-19.*
8. *Another paper in **The Lancet** found that the protection against XBB reinfection conferred by a previous omicron infection with vaccination was lower and waned faster than protection against BA.4 or BA.5 reinfection, suggesting the powerful immune evasion of the XBB isolates.*

References available in the chat

This Week's Emerging Infectious Disease News

9. *A potentially important preprint posted on **MedRxIV,** found that outpatient COVID-19 treatment of with metformin substantially decreased risk for long COVID; while neither ivermectin nor fluvoxamine had any effect*
10. *A study in the **British Medical Journal** found marginal superiority of boosting with Moderna vs. Pfizer-BioNtech vaccine in a broad, English population-based study.*
11. *A **Nature** study found that boosting with a novel heterologous protein subunit vaccine provided broader and more durable protection that boosting with the original mRNA vaccine.*
12. *A **Science Translational Medicine** paper found that prior SARS-CoV-2 infection modifies and augments the spike protein–specific memory induced by vaccination.*
13. *A report in **The Atlantic** provides the best evidence yet that spread from infected raccoon dogs at the Wuhan market was the source of the pandemic .*
14. *A New York Times commentary provided insight into the findings of the recent Cochrane review designed to assess physical interventions to interrupt the spread of respiratory viruses.*
15. *Randomized trials assessing parachute efficacy.*
    a. *Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials. **BMJ**. 2003;327(7429):1459-61*
    b. *Does usage of a parachute in contrast to free fall prevent major trauma: a prospective randomised-controlled trial in rag dolls. **Eur Spine J**. 2016;25(5):1349-54.*
    c. *Parachute use to prevent death and major trauma when jumping from aircraft: randomized controlled trial. **BMJ**. 2018;363:k5094*

References available in the chat

Panelists:

Dr. David Henderson
NIH Consultant

Dr. Sarah Haessler
Baystate Health

Dr. Kristina Bryant
University of Louisville

Dr. David Weber
UNC School of Medicine

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EMERGING INFECTIOUS DISEASES: *CANDIDA AURIS*

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

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Disclosures: Consultancy; Pfizer, Sanofi, PDI, Germitec, UVinnovators; past, Merck
All drugs/vaccines issues discussed consistent with FDA approvals or authorizations

WHO LIST OF PRIORITY DISEASES, 2015

- Arenaviral hemorrhagic fevers (including Lassa Fever)
- Crimean Congo Haemorrhagic Fever (CCHF)
- Filoviral diseases (including Ebola and Marburg)
- Middle East Respiratory Syndrome Coronavirus (MERS-CoV)
- Other highly pathogenic coronaviral diseases (such as Severe Acute Respiratory Syndrome, (SARS)
- Nipah and related henipaviral diseases
- Rift Valley Fever (RVF)
- Severe Fever with Thrombocytopenia Syndrome (SFTS)
- Zika

CDC BACTERIA AND FUNGI LISTED IN 2019 AR THREAT REPORT

- Urgent Threats: Carabpenem-resistant *Acinetobacter,* *Candida auris*, *Clostridioides difficile*, CRE, Drug resistant N. *gonorrhoeae*
- Serious Threats*:* Drug resistant *Campylobacter*, drug resistant *Candid*a, ESBL producing Enterobacterales, VRE, MDR-*P. aeruginosa*, drug resistant *Salmonella*, drug resistant Salmonella serotype Typhi, drug resistant *Shigella*, MRSA, drug resistant *S. pneumoniae*, drug resistant *M. tuberculosis*
- Concerning Threats: Erythromycin resistant Group A *Streptococcus*, Clindamycin resistant Group B *streptococcus*
- Watch List: Azole resistant *Aspergillus fumigatus*, drug resistant Mycoplasma genitalium, drug resistant *Bordetella pertussis*

https://www.cdc.gov/drugresistance/biggest-threats.html

CANDIDA AURIS: AN OVERVIEW, CDC

- *Candida auris* is an emerging fungus that presents a serious global health threat for the following reasons:
  - *C. auris* is spreading geographically and increasing in incidence.
  - *C. auris* may colonize patients for months to years (no method of decolonization). Infection (usually candidemia) has a high mortality (~60%).
  - It is often multidrug-resistant (e.g., echinocandins, triazoles, poyene {amphotericin B}). Some strains are resistant to all three available classes of antifungals.
  - It is difficult to identify with standard laboratory methods, and it can be misidentified in labs without specific technology. Misidentification may lead to inappropriate management.
  - It has caused multiple outbreaks in healthcare settings. For this reason, it is important to quickly identify *C. auris* in a hospitalized patient so that healthcare facilities can take special precautions to stop its spread.
- May 11, 2021: Updated Tracking *C. auris* to include historical and current U.S. interactive maps and downloadable datasets
- July 19, 2021: Environmental Protection Agency (EPA) has created List P, a list of EPA-registered disinfectants effective against *C. auris*
- Current needs: (1) rapid diagnostics; (2) new drugs; (3) decolonization methods; (4) registered, easy to use and effective disinfectants; (5) other tools or protocols for treatment and prevention

https://www.cdc.gov/fungal/candida-auris/index.html
https://www.cdc.gov/fungal/candida-auris/researchers-and-industry-professionals.html

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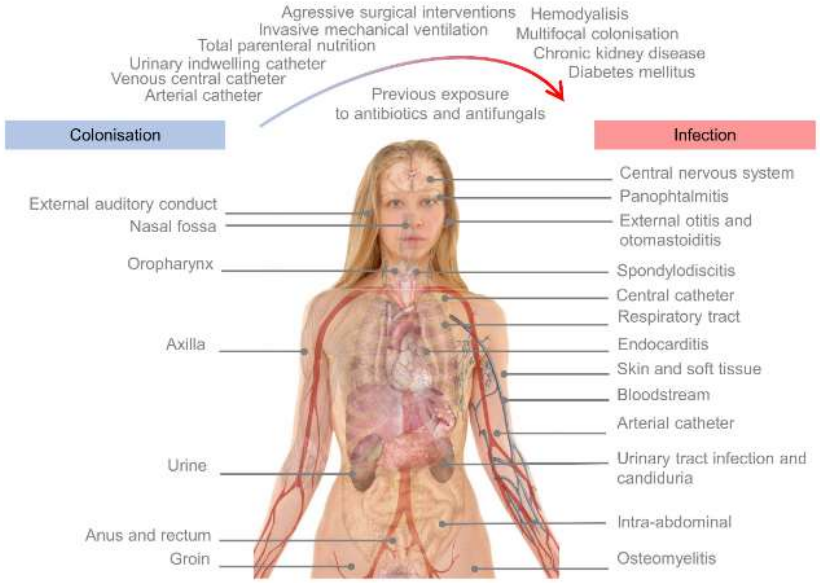
CANDIDA AURIS: EPIDEMIOLOGY

- First isolated in 2009 from ear discharge of a female patient in Japan; now reported in >45 countries worldwide
- Healthcare-associated outbreaks common
- Mortality ~65%-70%
- Primarily infects the usual spectrum of compromised individuals including those with uncontrolled diabetes mellitus, chronic renal diseases, neutropenia, and those on immunosuppressive therapy, broad-spectrum antimicrobials, and those with indwelling medical devices, or at extremes of age.
- Causes an array of human diseases ranging from fungemias, surgical/nonsurgical wound infections, urinary tract infections, meningitis, myocarditis, skin abscesses, to bone infections.



Bandara N, Smaranayake L. Med Mycology 2022;60:myac008; Lone S, Ahmad A 2019;62:620-637; Garcia-Bustos V, et al. Microgoranisms 2021;9:2177

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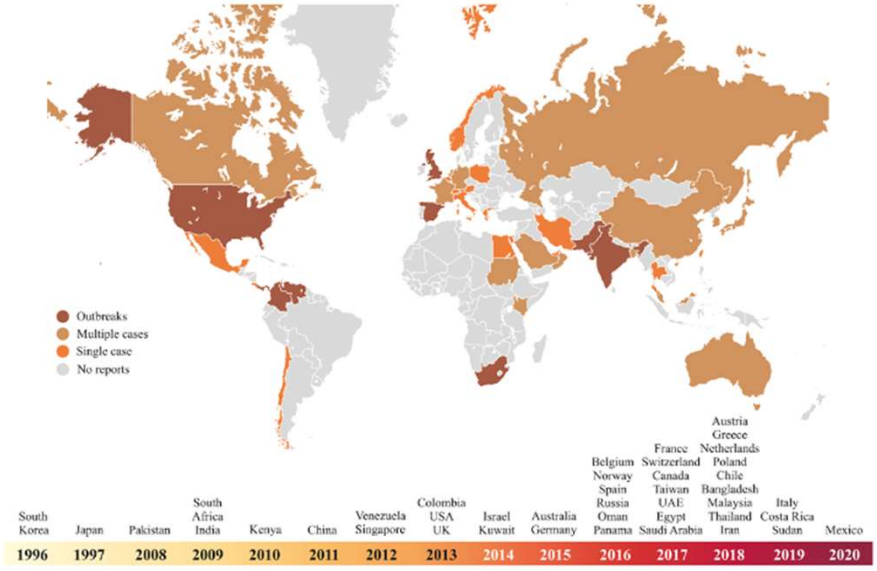
C. auris SURVEILLANCE, WORLDWIDE & US (CDC)



Chakravbarti A, Sood P. J Med Microbiol 2021;70:001318

International Multicentre Study of *Candida auris* Infections

- Retrospective observational multicentre study, 10 centers, 5 countries
- Significant risk factors for *C. auris* infection include the age group of 61–70 years (39%), recent history of ICU admission (63%), diabetes (63%), renal failure (52%), presence of CVC (91%) and previous history of antibiotic treatment (96%). *C. auris* was commonly isolated from blood (76%).
- All-cause crude mortality rate after 30 days was 37%. Antifungal therapy was associated with a reduction in mortality (OR:0.27) and so was source removal (OR:0.74). Contact isolation precautions were followed in 87% patients.

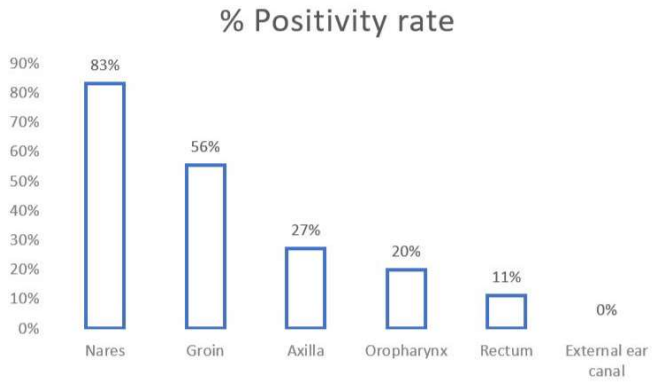
Table 2. Time from admission to positive culture.

No. of Days	Patient No.	Patient %
≤2 days	5	9%
3–7 days	8	15%
8–14 days	8	15%
15–30 days	17	31%
>1 month	16	30%

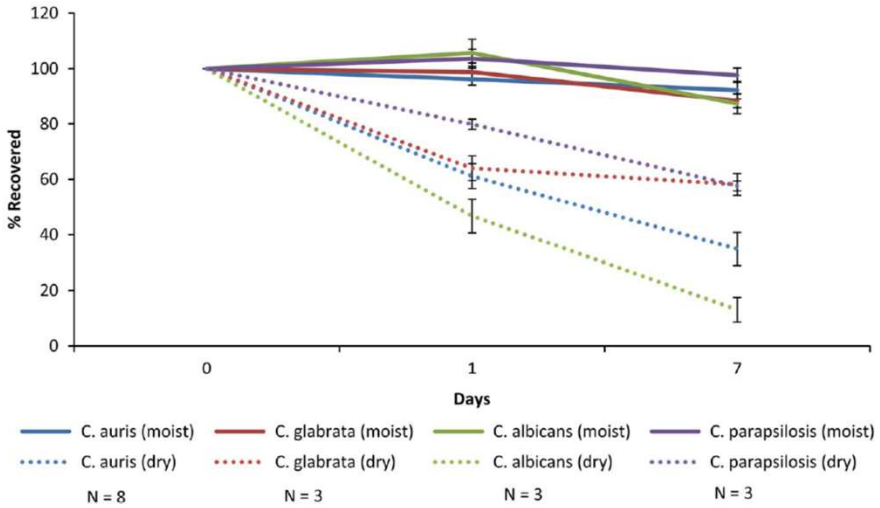
Pandya N, et al. J Fungi 2021;7:878

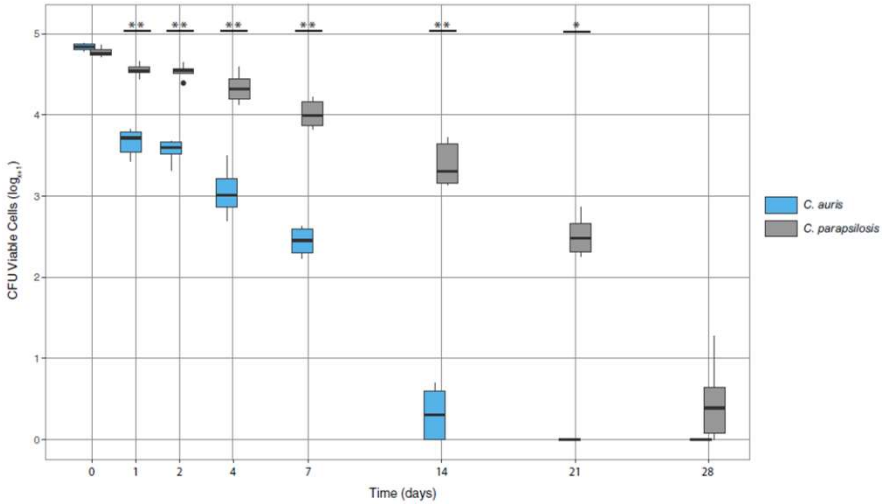
Table 4. Analysis to determine the risk factors for mortality among *C. auris* cases.

Risk Factor	Group-1 (Expired Patients)	Group-2 (Patients with Other Outcome)	Odds Ratio
Renal failure	67%	40%	3.0
Congestive Heart Failure	46%	17%	4.23
Invasive ventilator	75%	63%	1.74
Haemodialysis	63%	17%	8.33
Total parenteral Nutrition	33%	13%	3.25
Central Venous Catheter	100%	83%	4.60
Candidemia	88%	67%	3.5
Bacterial co-infection	58%	40%	2.1



ENVIRONMENTAL SURVIVAL OF *CANDIDA AURIS*





Piedrahita C, et al. ICHE 2017;38:1107-1109

Welsh RM, et al. J Clin Microbiol 2017;55:2996-3005

NOSOOCOMIAL OUTBREAK OF *C. auris*

(Biswal M, et al. JHI 2017;97:363-370)

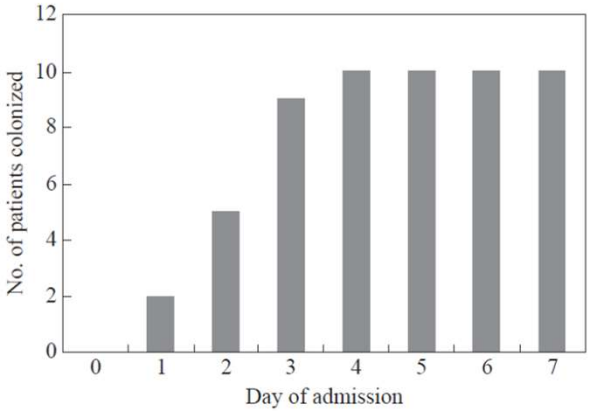


Figure 3. Time to *Candida auris* acquisition after intensive care unit admission.

Contamination of *Candida auris* on environmental samples and carriage on healthcare workers' hands

Samples	MICU	CCU	Trauma ICU	NSW
Environmental				
No. of samples	68	10	189	37
C. auris-positive samples	7	0	17	0
Handwash samples (HCWs)				
No. of samples	41	13	79	12
C. auris-positive samples	2	0	2	0

MICU, medical intensive care unit; CCU, cardiac care unit; ICU, intensive care unit; NSW, neurosurgical ward; HCW, healthcare worker.

Colonization rate by *Candida auris* of different body sites

Site	Oral	Rectal	Axilla	Groin
Trauma ICU				
No. of samples	89	83	158	168
Growth of *C. auris*	4 (4.4%)	15 (18%)	62 (39.2%)	34 (20.2%)
MICU				
No. of samples	38	35	38	38
Growth of *C. auris*	6 (15.7%)	3 (8.5%)	10 (26.3%)	2 (5.2%)
Total	10/95 (10.5%)	18/118 (15.2%)	72/196 (36.7%)	36/206 (17.4%)

ICU, intensive care unit; MICU, medical intensive care unit.

First hospital outbreak of the globally emerging *Candida auris* in a European hospital

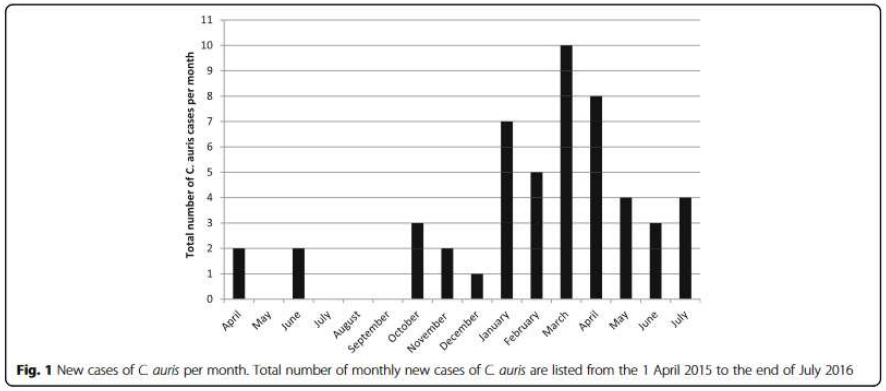


Fig. 1 New cases of *C. auris* per month. Total number of monthly new cases of *C. auris* are listed from the 1 April 2015 to the end of July 2016

CDC

- The risk of *C. auris* infection to otherwise healthy people, including healthcare personnel, is very low.
- At this time, HCP do not need to be tested for *C. auris* unless they are identified as a possible source of transmission to patients

https://www.cdc.gov/fungal/candida-auris/c-auris-health-qa.html

- As healthcare workers (HCW) have been implemented in the transmission of other Candida species in the past we have undertaken an extensive staff screening program involving doctors, nurses, physiotherapists, catering and cleaning staff, dieticians, a Chaplin and ward administrators. Staff hands (agar impression plates), nose, axilla, groin and throat swabs were analyzed for the presence of Candida. Only one out of 258 HCW screened were found to have a *C. auris* positive nose swab (all other samples were negative). This nurse had been caring for a heavily C. auris colonized patient. After a five day decolonization protocol with chlorhexidine washes, nasal ointment and oral nystatin medication (as described below) repeat microbiology samples were negative suggesting transient carriage only

Schelenz S, et al. Antimicrob Resistant Infect Control 2016;5:35

C. auris and COVID-19

Systematic review of *C. auris* in COVID-19 infections, 1/20/20 to 31/12/21

- Prevalence = 14%; Mortality = 44.4% (candidemia = 64.7%)

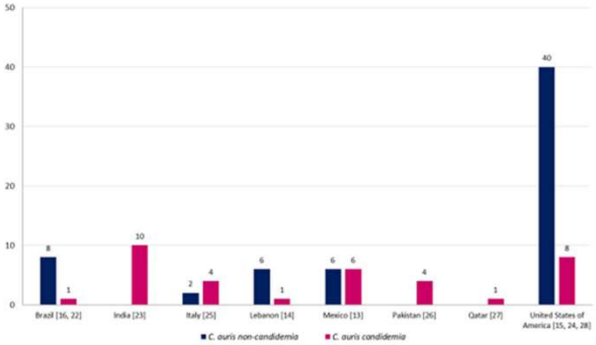


FIGURE 2 *Candida auris* cases in COVID-19 patients across countries. References are given in square brackets

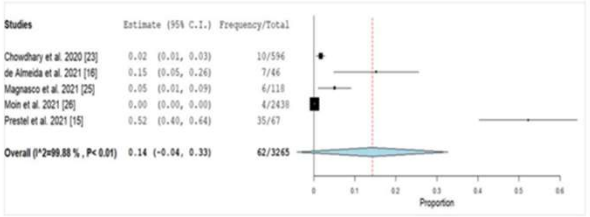


FIGURE 3 Forest plot of pooled prevalence of *Candida auris* infections in COVID-19 patients. "Frequency" denotes total number of *C. auris* cases and "Total" denotes total number of COVID-19 infected patients. References are given in square brackets. Abbreviations: C.I, Confidence Interval

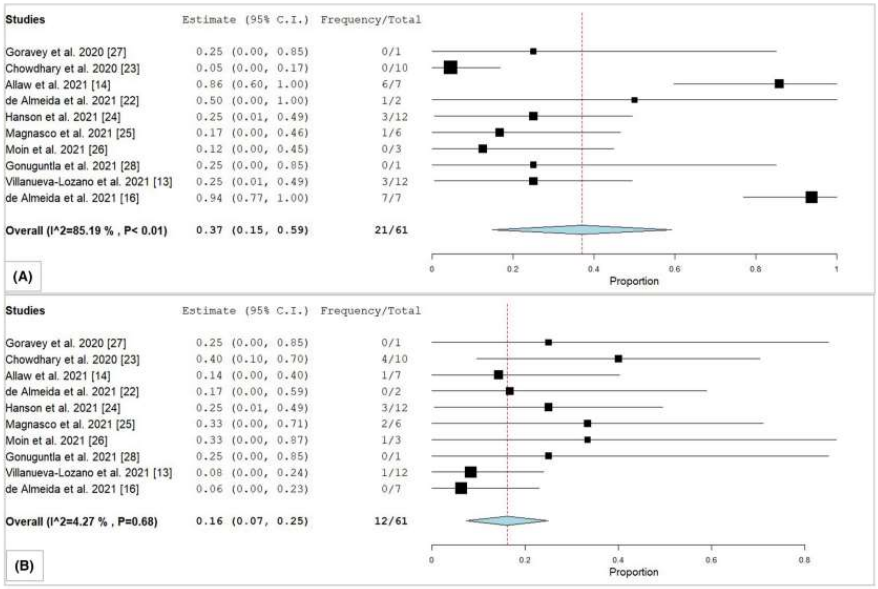


FIGURE 4 Forest plot of pooled survival estimates of (A) *Candida auris* non-candidemia/colonised (CANC) and (B) *Candida auris* candidemia (CAC) cases in COVID-19 patients. "Frequency" denotes total number of patients survived with *C. auris* infections and "Total" denotes total number of *C. auris* cases reported in each study. References are given in square brackets. Abbreviations: C.I, Confidence Interval

TABLE 3 Underlying disease and iatrogenic risk factors associated with mortality in *Candida auris* non-candidemia/colonised (CANC) and *Candida auris* candidemia (CAC) cases

Underlying disease[a] and iatrogenic risk factors	*Candida auris* non-candidemia (CANC)[b] (*n*)	*Candida auris* candidemia (CAC)[b] (*n*)	Death in CANC group (*n*)	Death in CAC group (*n*)	*p* value
Diabetes mellitus	11	12	2	9	.012*
Hypertension	10	17	3	12	.056
Central venous catheter	19	27	3	18	.0009*
Intensive care unit (ICU) stay	27	33	6	22	.0008*
Broad spectrum antibiotics	26	34	5	22	.0006*
Mechanical ventilation	22	24	5	18	.0009*
Steroid therapy	24	27	5	20	.0002*
Urinary catheter	17	19	3	13	.0031*
Co-infections along with *C. auris*	13	20	5	15	.067
Previous antifungal therapy	12	7	0	4	.009*

Note: The values in the table are expressed in numbers (*n*). '*n*' denotes the total number of patients. * '*p*' values <.05 were considered significant.
Abbreviations: CAC, *Candida auris* candidemia; CANC, *Candida auris* non-candidemia/colonised.
[a]Underlying disease and mortality association was statistically analysed for diabetes mellitus and hypertension alone. The number of cases for in other underlying diseases were less (refer Table 1), hence no statistical analysis was performed.
[b]The data for underlying diseases and iatrogenic risk factors of CANC and CAC cases were extracted from 10 studies.[13,14,16,22-28]

Vinayagamoorthy K, et al. Mycoses 2022;65:631-624

Tools for Detecting a "Superbug": Updates on *Candida auris* Testing

TABLE 1 Methods for identification or isolation of *Candida auris*

Test type and details	Notes[a]	Reference(s)
Culture		
Original enrichment broth	Valuable reference method for diagnostic development	30
Chromogenic medium	Aids visual identification to the species level of the common *Candida* spp.	24, 26, 27
Other differential media	Use of Pal's medium, ferrous sulfate, and crystal violet	25, 28, 29
Biochemical tests		
API 20C AUX	Cannot currently identify *C. auris*; see CDC follow-up algorithm	12, 15, 16
API ID 32C	Cannot currently identify *C. auris*; see CDC follow-up algorithm	12
BD Phoenix	Cannot currently identify *C. auris*; see CDC follow-up algorithm	12
MicroScan	Cannot currently identify *C. auris*; see CDC follow-up algorithm	12
RapID yeast plus	Cannot currently identify *C. auris*; see CDC follow-up algorithm	
Vitek 2 YST	Can ID some but not all *C. auris*; see CDC follow-up algorithm	17
MALDI-TOF MS		
Bruker Biotyper 2.0 Microflex LT	FDA approved for isolate ID with CA System library (v4)	20
bioMérieux Vitek MS	FDA approved for isolate ID with IVD library v3.2	19
Blood culture, molecular		
BioFire BCID2	FDA approved for positive blood culture	
GenMark Dx ePlex BCID-FP panel	FDA approved for positive blood culture	58
RT-PCR		
TaqMan chemistry	Most common LDT for colonization screening in U.S. PHL	41, 52
SYBR green chemistry	Evaluated for skin and anterior nares	39, 42
Commercial RT-PCR kits		
AurisID, OLM Diagnostics	CE-IVD reagents for *C. auris* RT-PCR	47
BioGX *Candida auris*	RUO reagents supporting RT-PCR and extraction on BD Max platform	
Fungiplex *Candida auris*	RUO reagents for *C. auris* RT-PCR	47
Other		
LAMP	Unique molecular method for *C. auris* detection	40
T2MR *C. auris*	RUO test for *C. auris* using T2 magnetic resonance technology	50
Conventional PCR with GPI target	*C. auris* specific and multiplex tests feasible in low-resource settings	36–38

[a]ID, identification; LDT, laboratory-developed test; RUO, research use only; PHL, public health laboratories; CE-IVD, *in vitro* diagnostic approved for sale in the European Union; RT-PCR, real-time PCR.

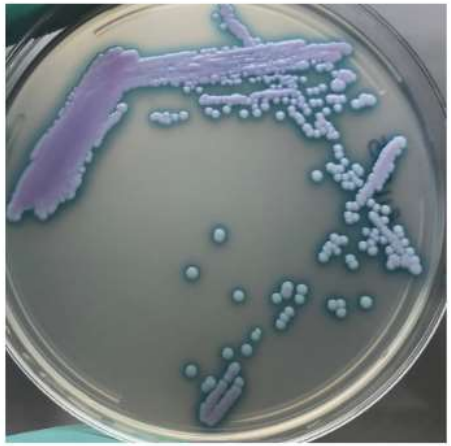


FIG 1 *Candida auris* after 48 h of growth on CHROMagar Candida plus showing light blue colonies with a blue halo around the colonies. The combination of the color and the halo are distinct for *C. auris* (also see reference 22).

Lockhart SR, et al
J Clin Microbiol 2022;60:1

UNC SCHOOL OF MEDICINE

Antifungal Susceptibility Testing and Interpretation

Antifungal Susceptibility Testing and Interpretation

Español | Print

All *Candida auris* isolates should undergo antifungal susceptibility testing according to CLSI guidelines. Although *C. auris* is commonly multidrug resistant, levels of antifungal resistance can vary widely across isolates.

There are currently no established *C. auris*-specific susceptibility breakpoints. Therefore, breakpoints are defined based on those established for closely related *Candida* species and on expert opinion. Correlation between microbiologic breakpoints and clinical outcomes is not known at this time. For this reason, the information below should be considered as a general guide and not as definitive breakpoints for resistance. Please note that a finding of an elevated minimum inhibitory concentration (MIC) for an antifungal drug should not necessarily preclude its use, especially if the use of other antifungal drugs for the patient has been ineffective.

Triazole Class Drugs	Tentative MIC Breakpoints (µg/mL)	Comment
Fluconazole	≥32	Modal minimum inhibitory concentration (MIC) to fluconazole among isolates tested at CDC was ≥256; isolates with MICs ≥32 were shown to have a resistance mutation in the *Erg11* gene, making them unlikely to respond to fluconazole.
Voriconazole and other second generation triazoles	N/A	Consider using fluconazole susceptibility as a surrogate for second generation triazole susceptibility assessment. However, isolates that are resistant to fluconazole may respond to other triazoles occasionally. The decision to treat with another triazole will need to be made on case-by-case basis.

Polyene Class Drug	Tentative MIC Breakpoints (µg/mL)	Comment
Amphotericin B	≥2	Recent pharmacokinetic/pharmacodynamic analysis of *C. auris* in a mouse model of infection indicates that under standard dosing, the breakpoint for amphotericin B should be 1 or 1.5, similar to what has been determined for other *Candida* species. Therefore, **isolates with an MIC of ≥2** should now be considered resistant. **If using Etest for amphotericin B and an MIC of 1.5 is determined, that value should be rounded up to 2.**

Echinocandin Class Drugs	Tentative MIC Breakpoints (µg/mL)	Comment
Anidulafungin	≥ 4	Tentative breakpoints are based on the modal distribution of echinocandin MICs of approximately 100 isolates from diverse geographic locations.
Caspofungin	≥ 2	
Micafungin	≥ 4	

Based on these MIC breakpoints, many isolates are resistant to multiple classes of drugs. Some U.S. *C. auris* isolates have been found to be resistant to all three classes of antifungal drugs. We have received reports of pan-resistance found in other countries as well. In the United States, about 90% of *C. auris* isolates have been resistant to fluconazole, about 30% have been resistant to amphotericin B, and less than 5% have been resistant to echinocandins. These proportions may include multiple isolates from the same individuals and may change as more isolates are tested.

https://www.cdc.gov/fungal/candida-auris/c-auris-antifungal.html

Notes from the Field: Transmission of Pan-Resistant and Echinocandin-Resistant *Candida auris* in Health Care Facilities; TX and the DC, January–April 2021

- *Candida auris* is an emerging, often multidrug-resistant yeast that is highly transmissible, resulting in health care–associated outbreaks, especially in long-term care facilities. Skin colonization with *C. auris* allows spread and leads to invasive infections, including bloodstream infections, in 5%–10% of colonized patients. Three major classes of antifungal medications exist for treating invasive infections: azoles (e.g., fluconazole), polyenes (e.g., amphotericin B), and echinocandins. ~85% of *C. auris* isolates in the US are resistant to azoles, 33% to amphotericin B, and 1% to echinocandins, based on tentative susceptibility breakpoints.
- Pan-resistant *C. auris* isolates have been reported previously, although rarely, from the US and other countries. 3 pan-resistant *C. auris* cases reported in NY developed resistance following echinocandin treatment and lacked epidemiologic links or common health care, suggesting that resistance resulted from antifungal pressure rather than via person-to-person transmission. Since January 2021, however, the Antibiotic Resistance Laboratory Network has detected independent clusters of pan-resistant or echinocandin-resistant cases in Texas and the District of Columbia (DC). Each cluster involved common health care encounters and no known previous echinocandin exposure, suggesting transmission of pan- and echinocandin-resistant strains for the first time in the US.
- Among 101 clinical and screening cases of *C. auris* in DC during Jan–April 2021, 3 had an isolate that was pan-resistant.
- Among 22 clinical and screening cases of *C. auris* in TX during the same period, two were pan-resistant and five were resistant to both echinocandins and fluconazole.
- *C. auris* plus COVID-19 patients (N=41): resistance was noted in 33 isolates (80.5%) to fluconazole (MIC ≥ 32 mg/L), followed by 19 (46.3%) to amphotericin B (MIC ≥ 2 mg/L), 5 (12.8%) to caspofungin (MIC ≥ 2 mg/L), 2 (5.1%) to anidulafungin (MIC ≥ 4 mg/L), 1 (3.7%) to micafungin (MIC ≥ 4 mg/L), and 7 (43.8%) to 5-flucytosine (MIC ≥ 32 mg/L). Voriconazole non-susceptibility (MIC ≥ 2 mg/L) was observed in 12 (29.3%) *C. auris* isolates*

Lyman M, et al. MMWWR 2021;70:1022-1023; *Vinayagamoorthy K, et al. Mycoses 2022;65:613

UNC SCHOOL OF MEDICINE

Treatment and Management of *C. auris* Infections and Colonization, CDC

- Consultation with an infectious disease specialist is highly recommended when caring for patients with *C. auris* infection.
- Even after treatment for invasive infections, patients generally remain colonized with C. auris for long periods, and perhaps indefinitely.
- Adults and children ≥ 2 months of age: Based on the limited data available to date, an echinocandin drug at a dose listed below is recommended initial therapy for treatment of *C. auris* infections. Most strains of *C. auris* found in the US have been susceptible to echinocandins although reports of echinocandin or pan-resistant cases are increasing. This organism appears to develop resistance quickly. Patients on antifungal treatment should be carefully monitored for clinical improvement. Follow-up cultures and repeat susceptibility testing should be conducted. Both recurrent and persistent *C. auris* bloodstream infections have been documented.
- Switching to a liposomal amphotericin B (5 mg/kg daily) could be considered if the patient is clinically unresponsive to echinocandin treatment or has persistent fungemia for >5 days. Data are lacking about the most appropriate therapy for pan-resistant strains. Combination antifungal treatment yielded promising results in laboratory testing but has not been evaluated in clinical settings. Investigational drugs (Fosmanogepix, Ibrexafungerp) have been tried against *C. auris* and may be considered for patients with echinocandin-resistant isolates

https://www.cdc.gov/fungal/candida-auris/c-auris-treatment.html

Dose information for Adults and Children ≥ 2 months of age

Echinocandin Drug	Adult dosing	Pediatric dosing
Anidulafungin	loading dose 200 mg IV, then 100 mg IV daily	not approved for use in children
Caspofungin	loading dose 70 mg IV, then 50 mg IV daily	loading dose 70mg/m^2/day IV, then 50mg/m^2/day IV (based on body surface area)
Micafungin	100 mg IV daily	2mg/kg/day IV with option to increase to 4mg/kg/day IV in children at least 40 kg

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Susceptibility of *C. auris* and *C. albicans* to 21 germicides used in healthcare facilities

- Goal: Assess susceptibility of *C. auris* to germicides
- Methods: Disc-based quantitative carrier testing
- Results: All of the FDA-cleared high-level disinfectants have a registration claim >1 minute (e.g., 8–45 minutes). In summary, with the exception of a water-based QAC and a 1:50 dilution of sodium hypochlorite, our data demonstrate that most disinfectants (10 of 13, 77%) used in healthcare facilities are effective (>3-$\log_{10}$ reduction) against *C. auris*.

Germicide name	Manufacturer, Location	Active Ingredient	Formulation Tested	Classification	*C. auris*[a]	*C. albicans*[a]
Purell Advanced instant hand sanitizer	GOJO, Akron, OH	70% ethanol	Undiluted	Antiseptic	4.0	2.5
Betadine solution	Purdue Products, Stamford, CT	10% povidone–iodine/1% iodine	Undiluted	Antiseptic	2.5	2.3
Medicated Soft 'N Sure	Steris, St. Louis, MO	0.5% triclosan	Undiluted	Antiseptic/Handwash	1.4	1.7
Soft Care Defend	Diversey, Charlotte, NC	1% chloroxylenol	Undiluted	Antiseptic/Handwash	2.8	3.9
Avagard	3M, St Paul, MN	1% chlorhexidine gluconate solution, 61% ethyl alcohol	Undiluted	Antiseptic/Surgical hand scrub	2.0	1.9
Scrub-Stat 2%	Ecolab, St Paul, MN	2% chlorhexidine gluconate solution	Undiluted	Antiseptic/Surgical hand scrub/handwash	1.6	2.8
Scrub-Stat 4%	Ecolab, St Paul, MN	4% chlorhexidine gluconate solution	Undiluted	Antiseptic/Surgical hand scrub/handwash	1.9	3.5
Isopropyl rubbing alcohol 70% USP	Medichoice, Mechanicsville, VA	70% isopropyl alcohol	Undiluted	Antiseptic/Disinfectant	3.8	4.1
Solution of hydrogen peroxide 3% USP	Medichoice, Mechanicsville, VA	3% hydrogen peroxide	Undiluted	Antiseptic	1.4	1.8
Austin's A-1 bleach 1:10	James Austin Co, Mars, PA	5.25% sodium hypochlorite (~6,100–6,700 ppm)	1:10 dilution	Disinfectant	4.1	4.0
Austin's A-1 bleach 1:50	James Austin Co, Mars, PA	5.25% sodium hypochlorite (~1,245 ppm)	1:50 dilution	Disinfectant	1.6	1.5
Vesphene IIse	Steris, St Louis, MO	9.09% o-phenylphenol, 7.66% p-tertiary amylphenol	1:128 dilution	Disinfectant	4.1	3.6
Hydrogen peroxide cleaner disinfectant	Clorox, Oakland, CA	1.4% hydrogen peroxide	Undiluted	Disinfectant	4.1	4.1
Lysol disinfectant spray	Reckitt Benckiser, Parsippany, NJ	58% ethanol, 0.1% QAC[b]	Undiluted	Disinfectant	3.8	4.1
A-456 II disinfectant cleaner	Ecolab, St Paul, MN	21.7% QAC[c]	1:256 dilution	Disinfectant	1.7	1.5
Super Sani-Cloth wipe	PDI, Orangeburg, NY	55% isopropyl alcohol, 0.5% QAC[d]	Undiluted[f]	Disinfectant	3.9	4.1
Prime Sani-Cloth wipe	PDI, Orangeburg, NY	28.7% isopropyl alcohol, 27.3% ethyl alcohol, 0.61% QAC[e]	Undiluted[f]	Disinfectant	4.1	4.1

Rutala WA, et al. ICHE 2019;40:380-382

Key interventions recommended (or to be considered) by select governmental agencies to prevent transmission of *Candida auris*

Agency (country/ region)	Active surveillance population	Hand hygiene	Isolation	Transmission-based precautions	Environmental disinfection	Additional special measures	Reference
Centers for Disease Control and Prevention (USA)	Contacts of newly identified case patients. Patients with an overnight stay in a healthcare facility outside of the USA in the previous year	Alcohol-based hand rub, or soap and water if hands are visibly soiled	Single room or cohorting with another patient with *C. auris*	Standard and contact precautions, for the duration of colonization, perhaps indefinitely	Use a disinfectant active against *Clostridioides difficile* spores	Minimize the number of care providers	[91]
Public Health England (UK)	Patients admitted from affected hospitals within the UK or from hospitals in countries reporting outbreaks. Close contacts in intensive care settings or contacts of patients prior to implementation of isolation procedures	Soap and water followed by alcohol-based hand rub	Single room or cohorting for colonized or infected patients or pending screening from high-risk areas	Contact precautions	Post-discharge terminal cleaning with sodium hypochlorite disinfectant, with or without no-touch disinfection	Single-use medical equipment; chlorhexidine skin washes for critically ill patients, mouth gargle with chlorhexidine, and topical nystatin and terbinafine at key sites	[92]
European Centre for Disease Prevention and Control (Europe)	Patients recently admitted or transferred from hospitals with detected *C. auris* case. Close contact patients	–	Single room or cohorting	Contact precautions	Post-discharge terminal cleaning with chlorine-based disinfectants, hydrogen peroxide or other disinfectants with fungicidal activity	Staff cohorting. Single-use equipment or cohorting of equipment among cases	[61•]
Centre for Opportunistic, Tropical and Hospital Infections (South Africa)	Routine screening on admission not recommended	Soap and water followed by alcohol-based hand rub	Single room or cohorting	Standard and contact precautions	Environmental cleaning with a chlorine-based disinfectant and consider hydrogen peroxide vapor for no-touch disinfection after terminal cleaning	Off-unit procedures should be scheduled for last case of the day, followed by thorough cleaning	[93]

Synder GM Wright SB. Curr Infectiious Dis Report 2019;21:19

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SUSCEPTIBILITY OF *C. auris* TO UV

- UV-C efficacy assessed against MRSA, *C. auris*, *Candida* sp., and MRSA[1]
  - *C. auris* less susceptible to UV-C than MRSA; similar but slight less susceptible than *C. difficile*
  - Increasing exposure time (10 to 20 to 30 min) resulted in enhanced killing; at 20 min, >4.5 $\log_{10}$; at 30 min >6 $\log_{10}$
- Pulsed xenon efficacy assess against *C. auris*[2]
  - 99.4% reduction in *C. auris* CFU after 5min at 1m and 99.6% after 10min at 2m
- Killing of *C. auris* by UV-C: Importance of exposure time and distance[3]
  - Maximal effect of *C. auris* killing found at 30min exposure at 2m (maximal killing, >5 $\log_{10}$). With half the time or twice the distance, efficacy diminished to ~10 and ~50-fold, respectively. At suboptimal exposure times and distance, strains from Japan/Korea more sensitive to UV-C killing than from Venezuela, Spain and India.
- Clade-specific variation in susceptibility of *C. auris* to UV-C[4]
  - Increased susceptibility of *C. auris* belonging to clades I, II and IV with increasing UV exposure time. *C. auris* isolates susceptible to UV-C were mostly nonaggregating, but the isolates that were more resistant to UV exposure formed aggregates.
- Efficacy of relatively low-cost UV-C devices against *C. auris*[5]
  - Some low-cost devices provided effective decontamination. *C. auris* from clades III and IV were less susceptible that from clades I and II.
- Inactivation of C. *auris* by UV-C[6]
  - With an organic load (FCS), *C. auris* reduction ($\log_{10}$) were; 4.57 direct line of sight, 2.41 indirect line of sight
- UV-C disinfection using a robot for routine cleaning[7]
  - UV-C inhibited growth of *C. auris* in the lag phase, but not in the presence of rim shadows; *C. auris* not effectively killed by standard UV cycle

[1]Cadnum JL, et al. ICHE 2018;39:94; [2]Maslo C, et al. BMC ID 2019;19:540; 3 de Groot T, et al. Mycoses 2019;62:408; [4]Chatterjee P, et al. ICHE 2020;41: 1384; [5]Pearlmutter BS, et al. ICHE 2021, 1-5; [6]Rutala WA, et al. ICHE 2021, 1-3; 7 Astrid F, et al. Antimicrob Resist Infect Control 2021;10:84

CONCLUSIONS: *CANDIDA AURIS*

- *C. auris* is a growing worldwide threat due to high mortality, resistance to many antifungals, and difficulties in laboratory identification
- *C. auris* is capable of prolonged environmental survival; contamination of hospital surfaces is common
- *C. auris* killed by high-level disinfectants but has reduced susceptibility to some low-level disinfectants disinfectants (QACs) and to UV-C (use settings for *C. difficile*); *C. auris* is susceptible to alcohol based antiseptics
- References

  - Weber DJ, Rutala WA, Sickbert-Bennett EE. Emerging Infectious Diseases, Focus on Infection Prevention, Environmental Survival and Germicide Susceptibility: SARS-CoV-2, Mpox, and *Candida auris*. Am J Infect Control 2023 (In press)
  - Rutala WA, Kanamori H, Gergen MF, Sickbert-Bennett EE, Weber DJ. Inactivation of *Candida auris* and *Candida albicans* by ultraviolet-C. Infect Control Hosp Epidemiol. 2022 Oct;43(10):1495-1497.
  - Rutala WA, Kanamori H, Gergen MF, Sickbert-Bennett EE, Weber DJ. Susceptibility *of Candida auris* and *Candida albicans* to 21 germicides used in healthcare facilities. Infect Control Hosp Epidemiol. 2019 Mar;40(3):380-382.
  - Weber DJ, Sickbert-Bennett EE, Kanamori H, Rutala WA. New and emerging infectious diseases (Ebola, Middle Eastern respiratory syndrome coronavirus, carbapenem-resistant *Enterobacteriaceae*, *Candida aur*is): Focus on environmental survival and germicide susceptibility. Am J Infect Control. 2019 Jun;47S:A29-A38.
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Surveillance Testing Decisions in the Late Pandemic Phase

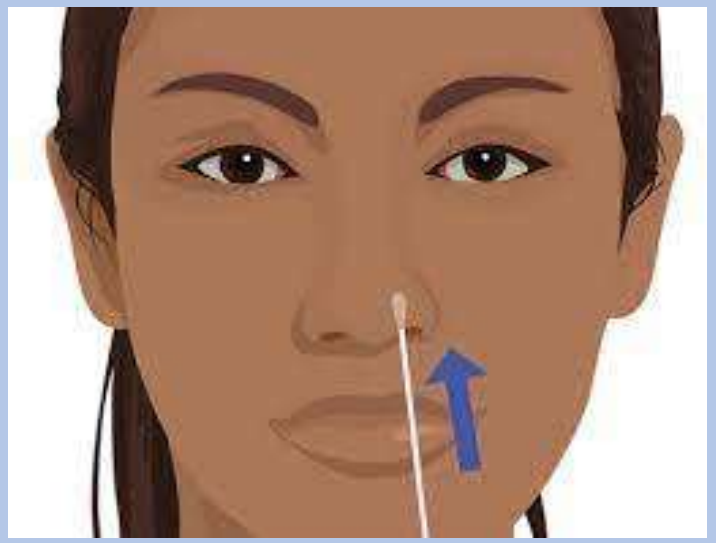
SHEA Town Hall Round 85

Sarah Haessler MD, MS, FSHEA

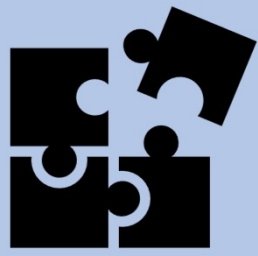
3/19/2023

Surveillance testing

- Testing asymptomatic patients on admission to the hospital
- Testing asymptomatic patients at regular intervals during hospital stay



My task



- Our current practice: Test all asymptomatic patients on admission to hospital plus every Monday and Thursday throughout stay
- Consultant's recommendation to senior leadership:
  - Surveillance testing is costing too much
  - "Nobody else is still doing it"
- Senior leadership:
  - Is this true?
  - What are we gaining at this point?
  - Is it mandated by DPH or recommended by CDC?
  - What are other organizations doing?
  - Should we stop?

Pro's to surveillance testing

- Admission testing:
  - Detects patients with asymptomatic or pre-symptomatic infection
  - Informs bed management and isolation precautions decisions
  - Protects roommate in semi-private room and HCP
- Regularly spaced surveillance testing:
  - Enables early detection and control of unit-level clusters
  - Pre-procedure/pre-AGP results always available

Cons to surveillance testing

- Expensive
- Not reimbursed under DRG
- Adds to task saturation among nurses
- Tracking adds to task saturation among IP and HE
- During endemic phase: big lift for small yield
- Can delay care and transfers
- Increased risk of false positives when disease burden is low
- Risk to HCP during AGP can be mitigated by PPE instead

Interim Infection Prevention and Control Recommendations for Healthcare Personnel During the Coronavirus Disease 2019 (COVID-19) Pandemic

Updated Sept. 27, 2022

- "The yield of screening testing for identifying asymptomatic infection is likely lower when performed on those in counties with lower levels of SARS-CoV-2 community transmission. However, these results might continue to be useful in some situations (e.g., when performing higher-risk procedures or for HCP caring for patients who are moderately to severely immunocompromised) to inform the type of infection control precautions used (e.g., room assignment/cohorting, or PPE used) and prevent unprotected exposures."

- "In general, performance of pre-procedure or pre-admission testing is at the discretion of the facility"

Pre-Procedure and Pre-Admission COVID-19 Testing No Longer Recommended for Asymptomatic Patients

SHEA
The Society for Healthcare Epidemiology of America

- ***DECEMBER 21, 2022***
- **ARLINGTON, VA** (December 21, 2022) — Healthcare facilities should no longer routinely screen symptom-free patients for COVID-19 upon admission or before procedures and rely instead on enhanced layers of infection prevention interventions, according to a recommendation from the Society for Healthcare Epidemiology of America (SHEA) published today in *Infection Control & Hospital Epidemiology*.
- "The small benefits that could come from asymptomatic testing at this stage in the pandemic are overridden by potential harms from delays in procedures, delays in patient transfers, and strains on laboratory capacity and personnel," said Thomas R. Talbot, MD, MPH, the Chief Hospital Epidemiologist at Vanderbilt University Medical Center, and a member of the SHEA Board of Directors. "Since some tests can detect residual virus for a long period, patients who test positive may not be contagious."
- The authors, members of the SHEA Board of Directors, noted a lack of evidence that asymptomatic testing reduces healthcare-associated COVID infections and suggest such testing requirements may disproportionally impact disadvantaged populations who have limited access to care and testing resources.
- The authors also cited research that shows asymptomatic COVID testing added 1.89 hours to the length of stay in the emergency department of an academic health system, and another study from a specialty hospital showed it cost more than $12,500 to identify one asymptomatic COVID patient.
- Facility risk assessments that include targeted scenarios, patient populations, or locations that may require added interventions along with community COVID-19 metrics should drive whether asymptomatic screening is part of institutional practices. While it is imperative to prevent healthcare-associated spread of respiratory pathogens, it is critical to examine which methods, when added upon core layers of infection prevention, work best to protect patients and healthcare providers.
- A hierarchy of controls to prevent infections can include universal use of N95 respirators when performing certain procedures, active screening of healthcare providers for signs of COVID-19, unit layouts that reduce shared patient spaces, and enhanced cleaning and ventilation.

My unscientific survey of peers this week (N=6)

- Majority of surveyed peers:
  - Testing asymptomatic patients on admission only
  - No routine surveillance testing except Behavioral Health and ONC/BMT units
- Relative outliers
  - Testing on admission plus regularly scheduled
    - Every 72 hours (my own health system)
    - Day 3 and 8 then Q5 days
  - No testing of asymptomatic patients at all

- Plus: APIC listserve question and APIC in-person meeting:
  - Small sampling of hospitals nationally
  - Most are only testing on admission or not at all

Internal data

- How often are we picking up asymptomatic positives with regularly scheduled surveillance testing?
  - 2-5 patients per week
  - On chart review, many have developed mild symptoms by the time of results
- How often are we picking asymptomatic positives on admission?
  - 7 day rolling positivity = 3-7% in past 3 months
  - Impossible to tease out asymptomatic from symptomatic

Considerations

- Number of semi-private rooms
- Mask wearing ability/behaviors among patients, HCP, visitors
- Setting: Behavioral health and open units are essentially congregate
- Severely immunocompromised patients concentrated in certain units, may shed for prolonged periods and make outbreaks difficult to control
- Endemic vs. surge phase

Our Decisions

- Large stakeholder group
- Decisions:
  - continue surveillance testing of all patients on admission to inform bed management due to majority semi-private rooms
  - Stop routine surveillance testing except Behavioral Health and Oncology
- Roll out over next two weeks
  - Lots of logistics to undo this (automated orders, education, dashboards)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Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

Gordon C S Smith, Jill P Pell

BMJ VOLUME 327 20–27 DECEMBER 2003 bmj.com

Eur Spine J (2016) 25:1349–1354
DOI 10.1007/s00586-016-4381-z

ORIGINAL ARTICLE

Does usage of a parachute in contrast to free fall prevent major trauma?: a prospective randomised-controlled trial in rag dolls

Patrick Czorlich[1] · Till Burkhardt[1] · Jan Hendrik Buhk[2] · Jakob Matschke[3] · Marc Dreimann[4] · Nils Ole Schmidt[1] · Sven Oliver Eicker[1]

RESEARCH

Parachute use to prevent death and major trauma when jumping from aircraft: randomized controlled trial

Robert W Yeh,[1] Linda R Valsdottir,[1] Michael W Yeh,[2] Changyu Shen,[1] Daniel B Kramer,[1] Jordan B Strom,[1] Eric A Secemsky,[1] Joanne L Healy,[1] Robert M Domeier,[3] Dhruv S Kazi,[1] Brahmajee K Nallamothu[4] On behalf of the PARACHUTE Investigators

BMJ. *2018;363:k5094*

My Assessment of the Cochrane Review

1. *Only considers randomized clinical trials; such trials are challenging for masking (particularly with respect to adherence); and excludes a vast body of credible observational and laboratory data.*
2. *The pandemic experience has been unique in our lifetime; compliance with masking in most academic centers approached 100%..*
3. *The review combined data from community (most) and from healthcare settings (minority).*
4. *Studies included in the review posed different questions and combining these is problematic.*
5. *All but two of the studies included were pre-pandemic studies; from my own observation masking behaviors were distinctly different during these two periods.*
6. *Most of the included studies assessed the transmission of non-COVID respiratory viruses (primarily influenza).*
7. *The review only assessed masking as protection; did not address source-control masking.*
8. *Adherence to making in the studies included was almost uniformly poor. Assessing mask efficacy when most people in the 'masked population' actually did not wear masks appropriately seems bizarre)*
9. *The Cochrane Editor-in-Chief has issued an apology for the manner in which the paper was summarized, calling the summary unclear and imprecise.*
10. *Regarding the lead author, who said in an interview, "There is just no evidence that masks make any difference," the Editor-in-Chief said, "One of the lead authors of the review even more seriously misinterpreted the reviews' findings," and further noted, that "the lead author's statement is not an accurate representation of what the review found.*
11. *The review itself includes this statement, "The high risk of bias in the trials, variation in outcome measurement and relatively low adherence with the interventions during the studies hampers drawing firm conclusions."*

References available in the chat

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