NEW YORK STATE Department of Health | Wadsworth Center

ARLABnetwork

Northeast Region Antibiotic Resistance Laboratory Network Newsletter

Volume 2 Issue 2 December 2022

ANTIMICROBIAL RESISTANCE LABORATORY NETWORK (ARLN) NEW STAFF

Anuradha Marathe, PhD. – ARLN Research Scientist
Anu obtained a M.S. in Biology from University of Wisconsin and a Ph.D. in Biochemistry from the University of Houston. In her Ph.D. program at the Department of Biology and Biochemistry in the laboratory of Dr. Masaya Fujita, she investigated the role of master regulator Spo0A in different stages of *Bacillus subtilis* sporulation. As a research scientist in the AR lab at the Wadsworth Center, Anu carries out testing to detect *Candida auris* in clinical isolates and from colonization screenings. Anu is also conducting applied research targeted towards improving the turnaround time for detection and identification of *C. auris*. She recently attended and presented her findings at the ASM microbe 2022 conference held in Washington D. C.

Mayuri Vaidya – ARLN Research Scientist - Mayuri earned her MS degree in Biology at the University of Texas, San Antonio in the lab of Dr. Gdovin's studying the potential of *o*- nitrobenzaldehyde to treat breast cancer. Following this, Mayuri worked as a Molecular Biologist at Eli Lilly. Mayuri joined the Mycology lab at the Wadsworth Center as a Research Scientist in December 2020. Her work involves performing susceptibility tests on yeast isolates and *C. auris* surveillance screening. Mayuri has assisted in testing the effect of high concentrations of 5-Flucytosine, Fluconazole, and 5-Fluorouracil in *C. auris*. Mayuri has also assisted in comparing different extraction and NGS kits for CDC's WGS project. Mayuri is currently assessing the Minimum Inhibitory Concentration (MIC) of *Candida* isolates of public health importance using two different testing methods.

Karla Lehtonen - ARLN Research Scientist
Karla graduated from the Massachusetts Institute of Technology with a bachelor's degree in Biology. Karla obtained an MPH degree from the School of Public Health, University at Albany, majoring in Biomedical and Public Health Sciences. While in the Biomedical Sciences program, Karla completed a research project on the structure and function of the ITev1 endonuclease. As part of the Public Health Science Program, she worked with the Opioid Syndromic Surveillance program at the Bureau of Surveillance and Data Systems. She also assisted in developing a survey for the Birth Defects Registry. Due to an extended illness in a close family member, Karla also has a passion for Lyme disease research and patient advocacy. Karla joined the Mycology Lab in September of 2022, where she is training in fungal diagnostics.

Shannon Murphy, PhD – APHL AR Fellow

Shannon earned a B.S. in biochemistry from the State University of New York (SUNY) at Geneseo and a Ph.D. in microbiology from Cornell University.

As a graduate researcher, she studied the bacterial cell wall – a structure that ranks among our most powerful targets for antibiotic intervention. She focused on β-lactam tolerance in the diarrheal pathogen *Vibrio cholerae* and investigated the ways that this bacterium modifies its cell wall mechanics in response to environmental stress. In pursuit of a career in translational research and clinical diagnostics, she recently joined the Wadsworth Center as an Association of Public Health Laboratories (APHL)/Center for Disease Control (CDC) fellow in 2021 to study antimicrobial resistance through the lens of public health. We are excited to have Shannon in the ARLN.

Shirley Kelly-Parson – AR Coordinator

Shirley started working in the ARLN team at Wadsworth Center in January 2017 as the AR Program Assistant. Shirley accepted the new AR Coordinator position in July 2022. In this role she is responsible for:

1. Working with HAI and AR partners to coordinate CRE and *C. auris* screening.
2. Developing fact sheets or summaries to share with facilities to encourage isolate submissions.
3. Developing and disseminating clinical lab focused newsletters with AR updates and summaries.
4. Facilitating calls or webinars to advise healthcare facilities and personnel on the collection and transportation of specimens.

Shanele Rivera – AR Program Assistant

Shanele Rivera is the ARLN Program Assistant. She has over 15 years of progressively responsible administrative experience with NYS DOH and continues to work on developing new skillsets. In 2021, Shanele graduated from Suny Empire with a Bachelor's degree in Community and Human Services, with a Minor in the study of Criminology. She also has an Associate degree in Criminal Justice from Schenectady Community College. When she is not working, she is a glorified taxicab driver for her three lovely teenage daughters. All her hard work is for them!

HIGHLIGHT - REGIONAL LABORATORY NEW TESTING

Portable Disease Surveillance Lab (PDSL)

Wadsworth Center is piloting the PDSL system (LabWare) to deliver mobile test ordering that transmits patient data test order information directly to our Laboratory Information Management System. The PDSL streamlines the patient registration and sample collection process. Each PDSL kit comes with 2 iPads, portable Wi-Fi and a label printer. Kits can be deployed in the field and used to enter patient demographics, order tests and print specimen labels onsite which can improve accuracy and efficiency of the ordering and labeling process. We've currently conducted 2 PDSL events at healthcare facilities in New York State (November 6th with 60 Samples and November 19th with 34 Samples). Both screening events were for *Candida auris*. We are hoping to utilize the PDSL system more in the upcoming year with collections of *Candida auris* and Carbapenemase- Producing Organisms (CPOs).

Portable Disease Surveillance Lab

Kit components contained in a rolling pelican case:

- 2 iPad tablets with stylus in tablet case
- 1 tablet Wi-Fi
- 1 mobile hotspot
- 1 wireless barcode printer
- 4 rolls of label stock
- 1 power brick battery
- 2 charging cables & connectors
- 1 power strip

PDSL Components

CARBAPENEM RESISTANT ORGANISM TESTING DATA AND ALERTS

In 2021, 205 isolates were submitted from Northeast State Public Health Laboratories (SPHL). Most isolates tested were CRE (70%) followed by CRAB (29%).

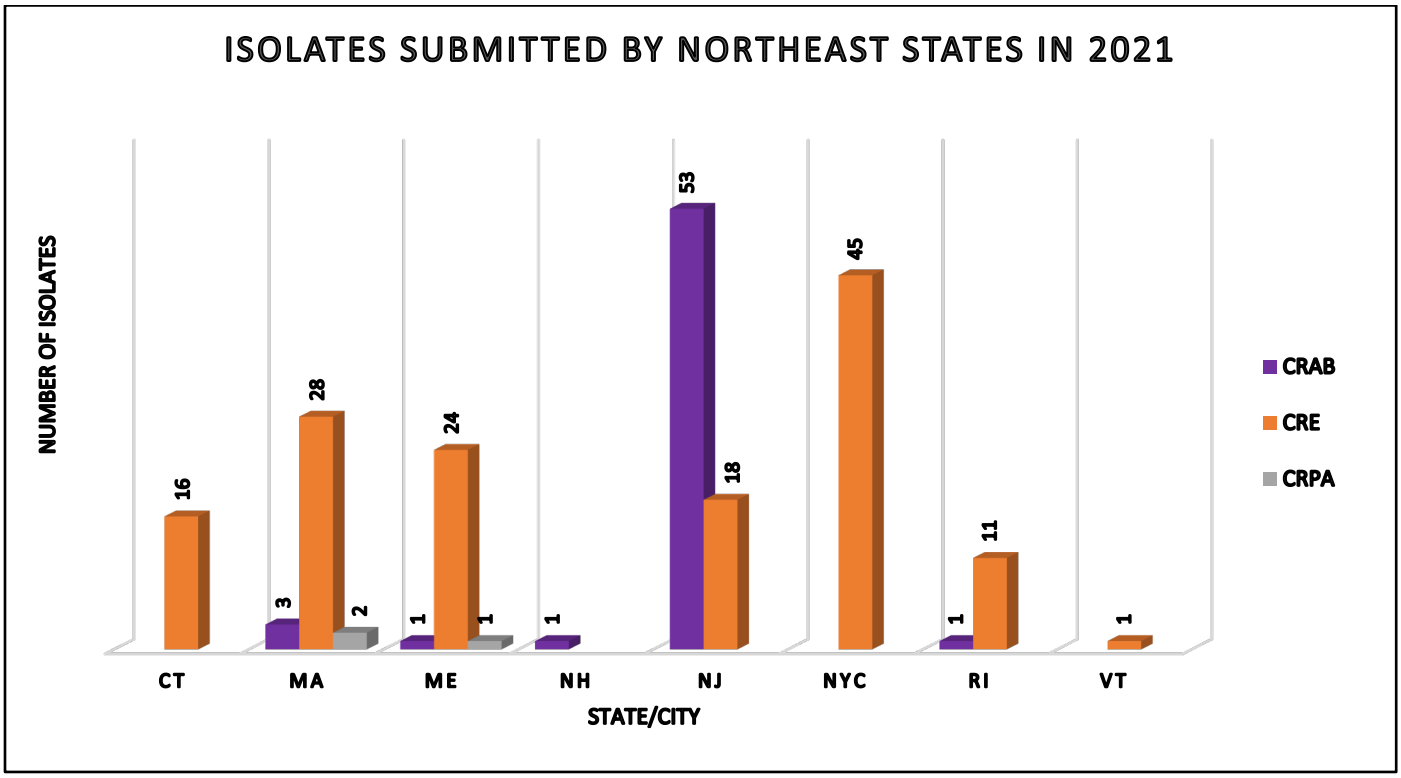

Figure 1. Number of CRO isolates submitted by Northeast SPHLs in 2021.

Organisms Identified by Carbapenemase Gene

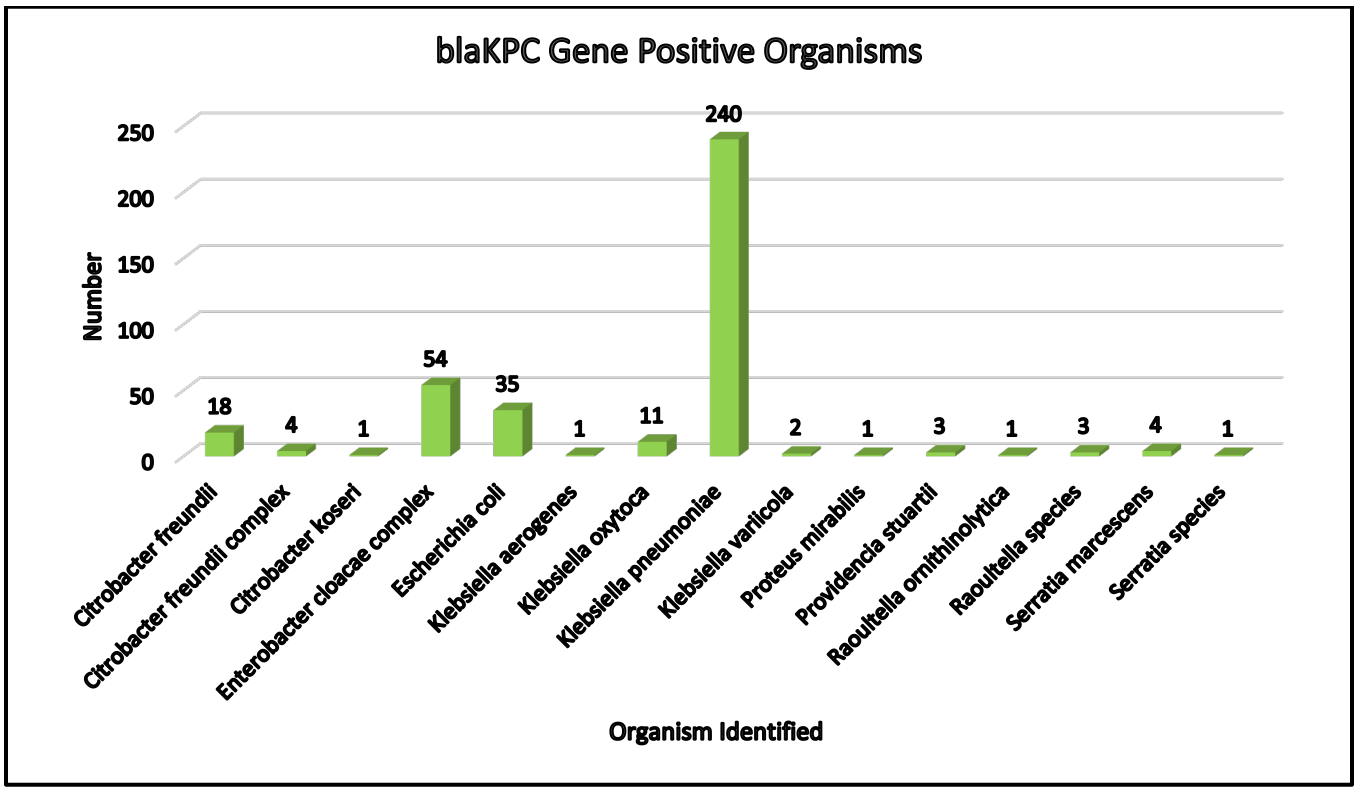

Figure 2. Number of organisms identified carrying the *bla*$_{KPC}$ carbapenemase gene.

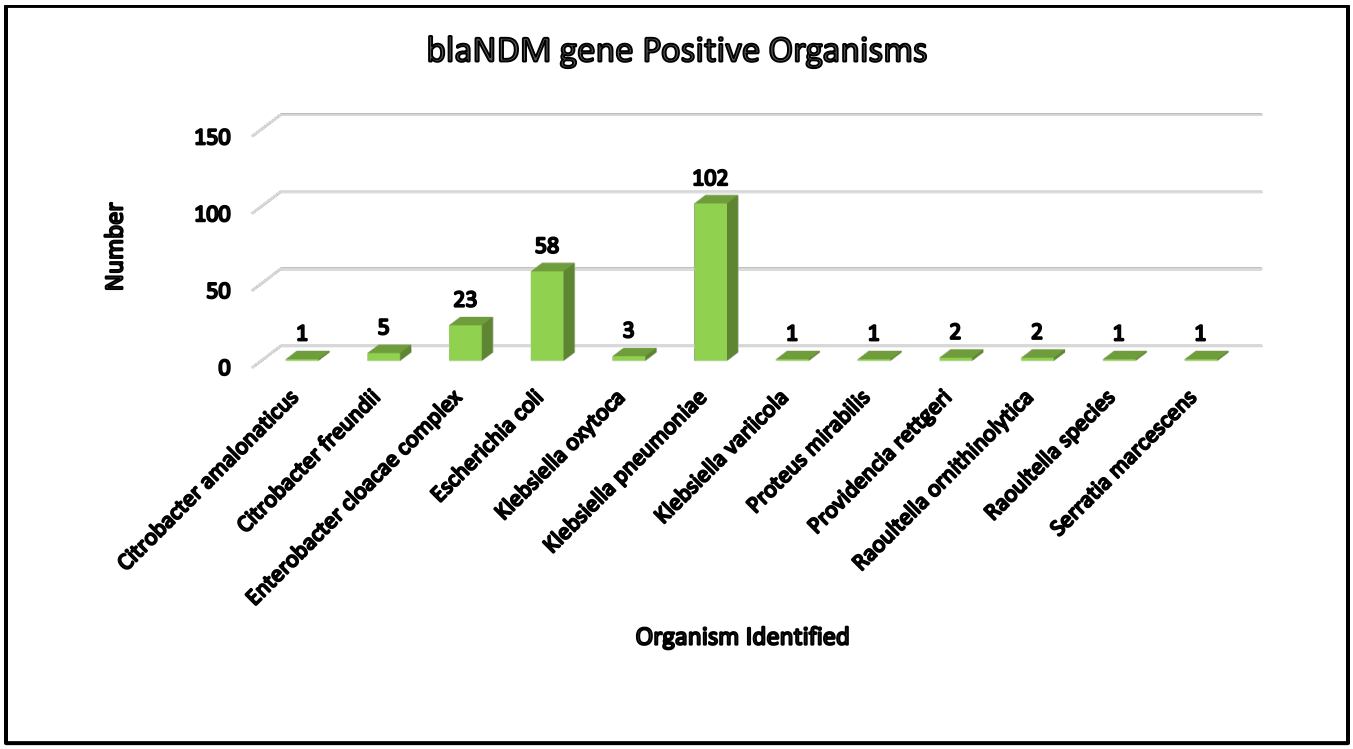

Figure 3. Number of organisms identified carrying the *bla*$_{NDM}$ carbapenemase gene.

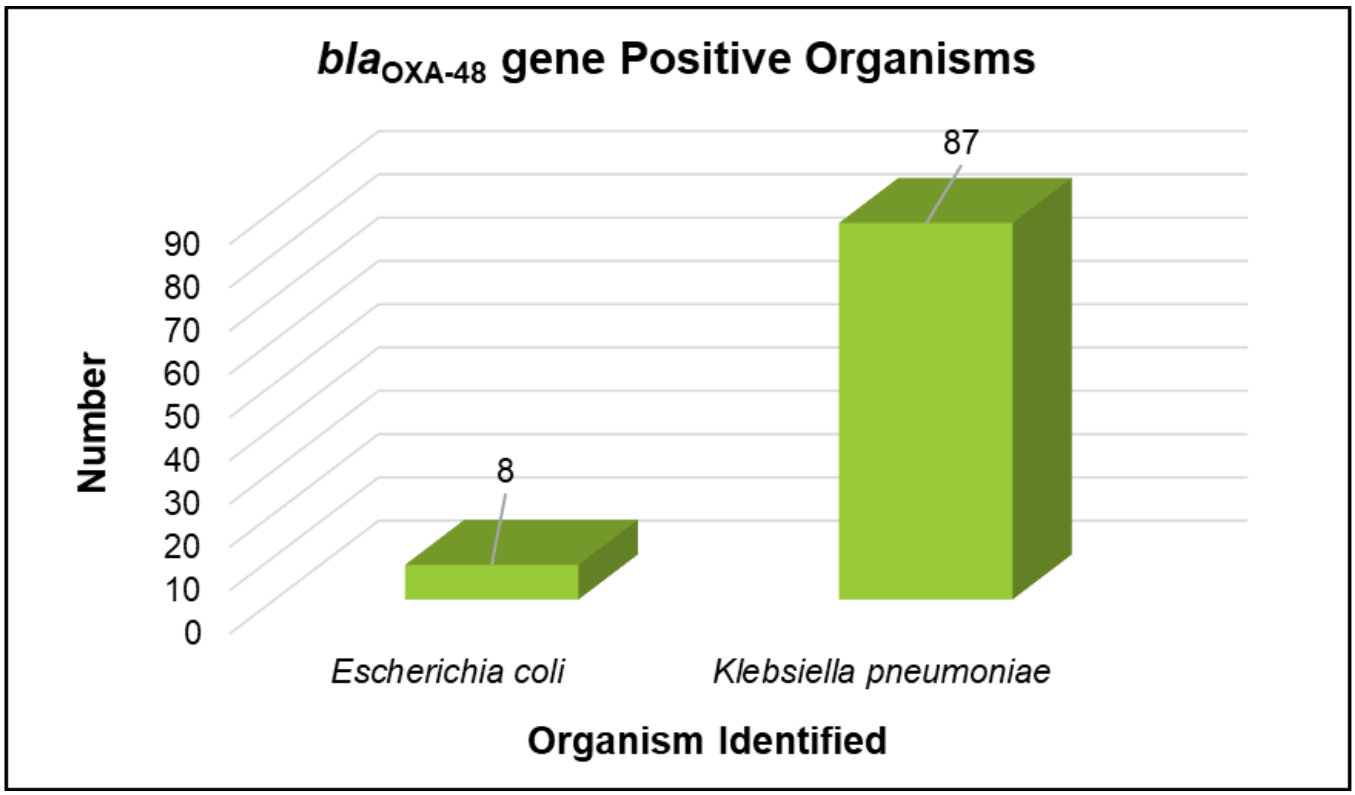

Figure 4. Number of organisms identified carrying the *bla*$_{OXA-48}$ carbapenemase gene.

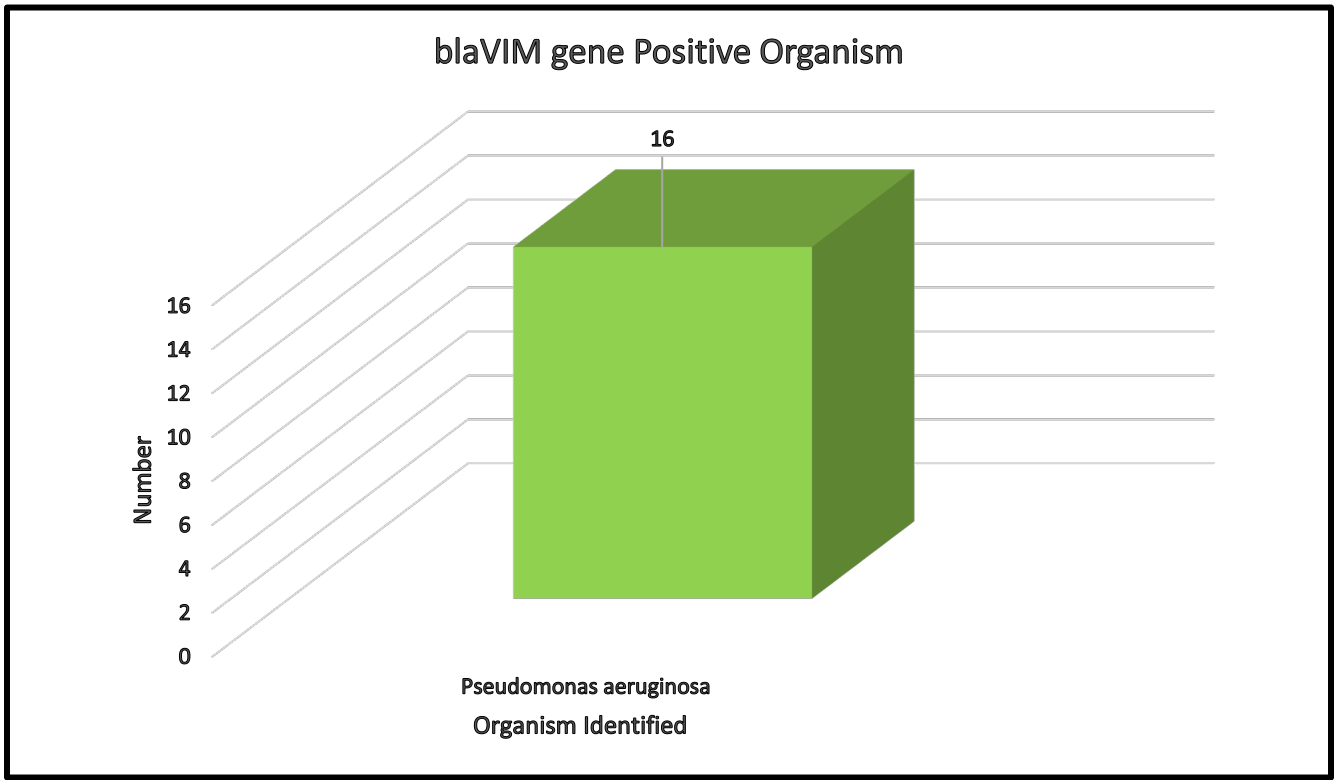

Figure 5. Number of organisms identified carrying the *bla*$_{VIM}$ carbapenemase gene.

Expanded Antimicrobial Susceptibility Testing for Hard-to-Treat Infections

In 2021, 40 isolates were submitted from the Northeast and Mid-Atlantic States for Expanded Antimicrobial Susceptibility Testing.

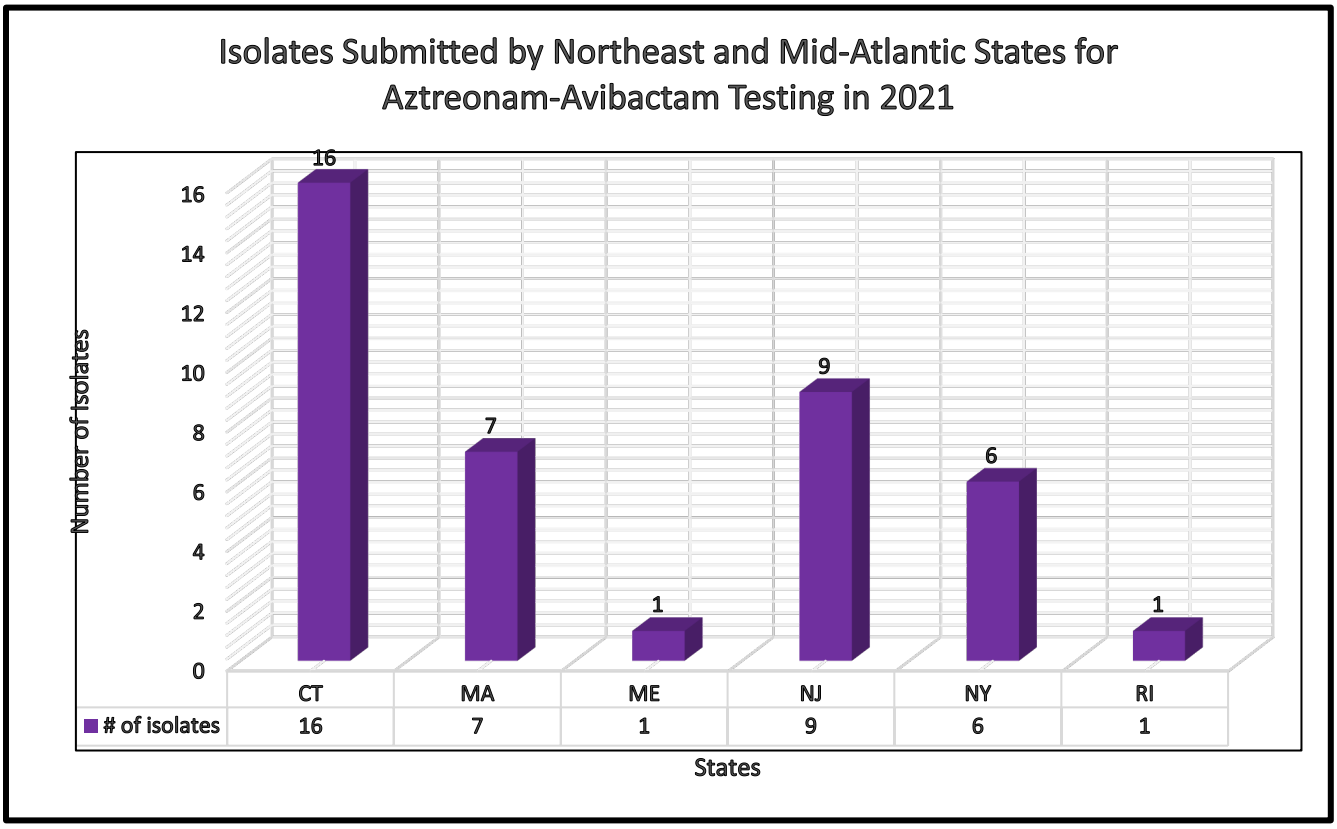

Figure 6. Number of isolates submitted by state for expanded antimicrobial susceptibility testing.

AR Lab Network CPO Colonization Screenings

In 2021, 3,500 rectal swabs were sent to 84 facilities in the Northeast Region for colonization testing.

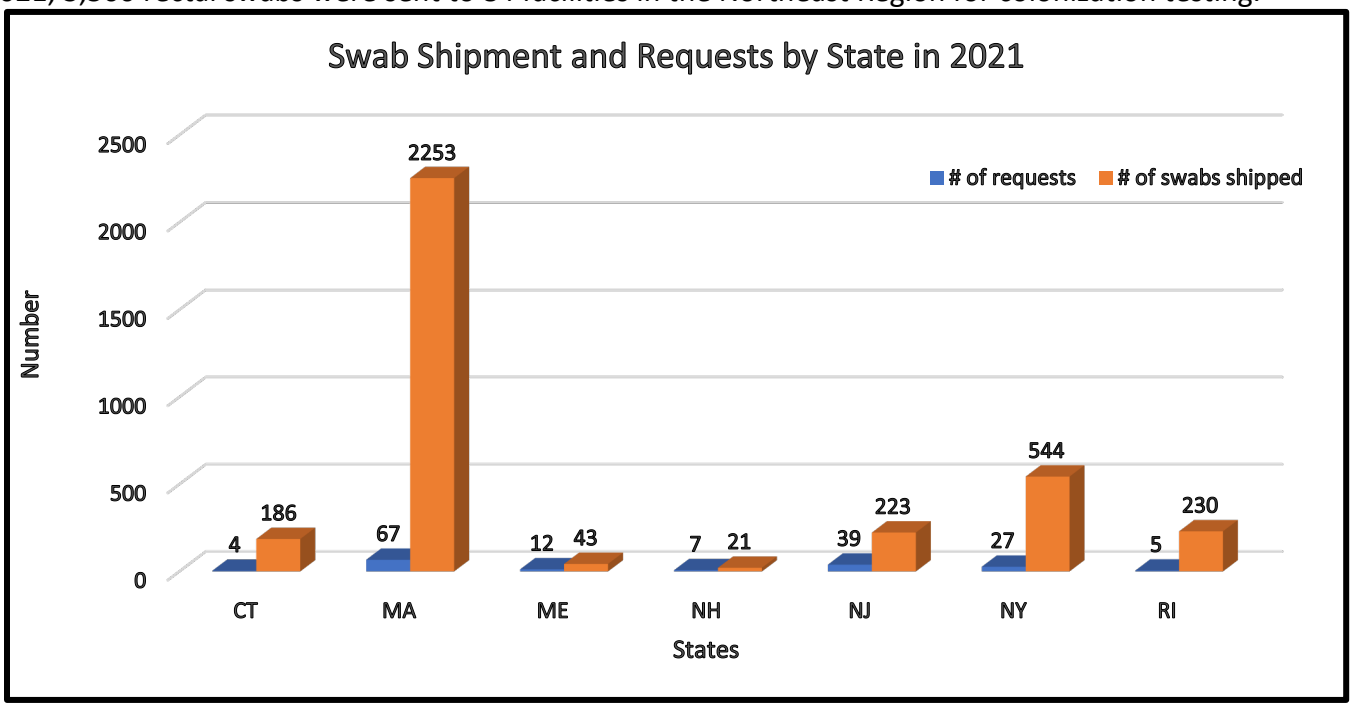

Figure 7. Number of requests and number of rectal swabs shipped to facilities across the Northeast states.

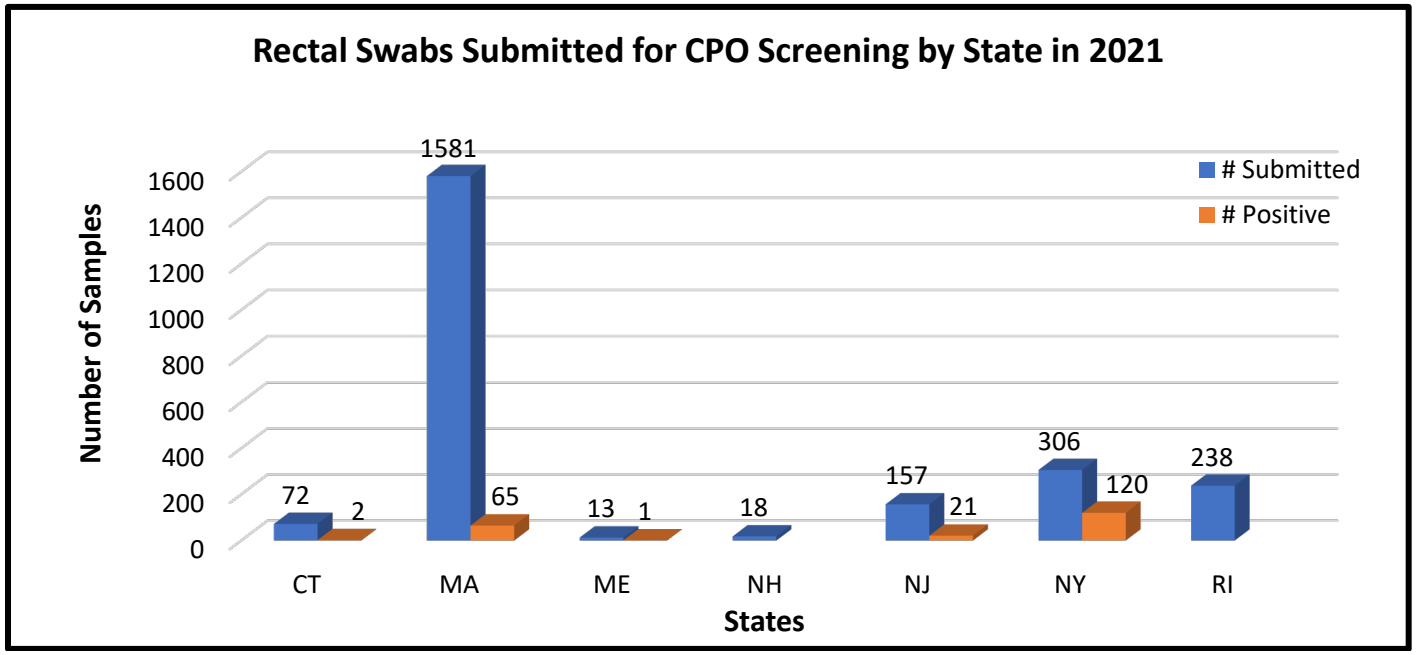

Figure 8. Number of rectal swabs submitted by State for colonization screening.

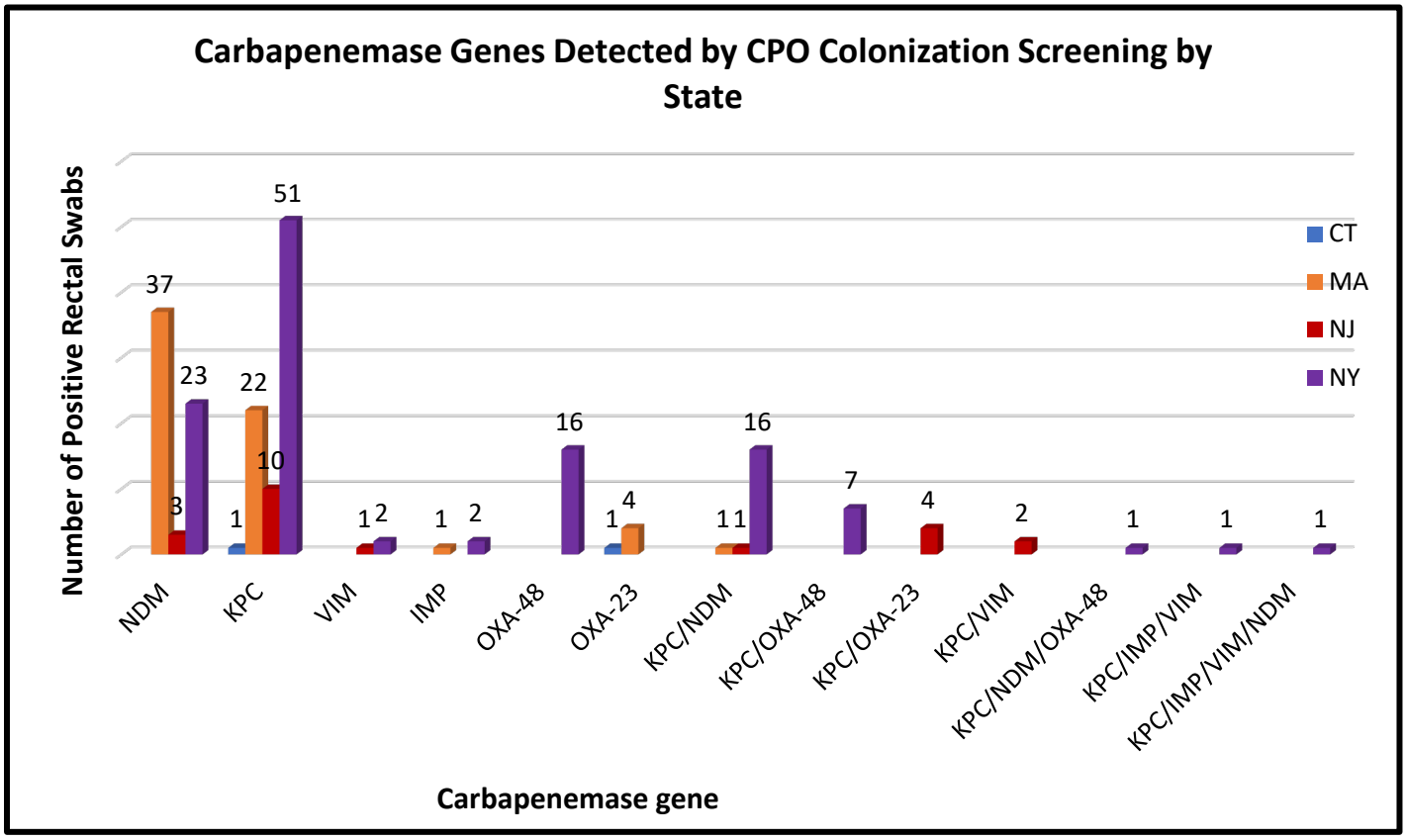

Figure 9. Carbapenemase genes detected during colonization screenings.

AR Alerts

In 2021, 389 New York State alerts were reported to the CDC and State Epidemiologists. In 2021, there were 143 alerts from Northeast States reported to the CDC by the NE Regional Lab.

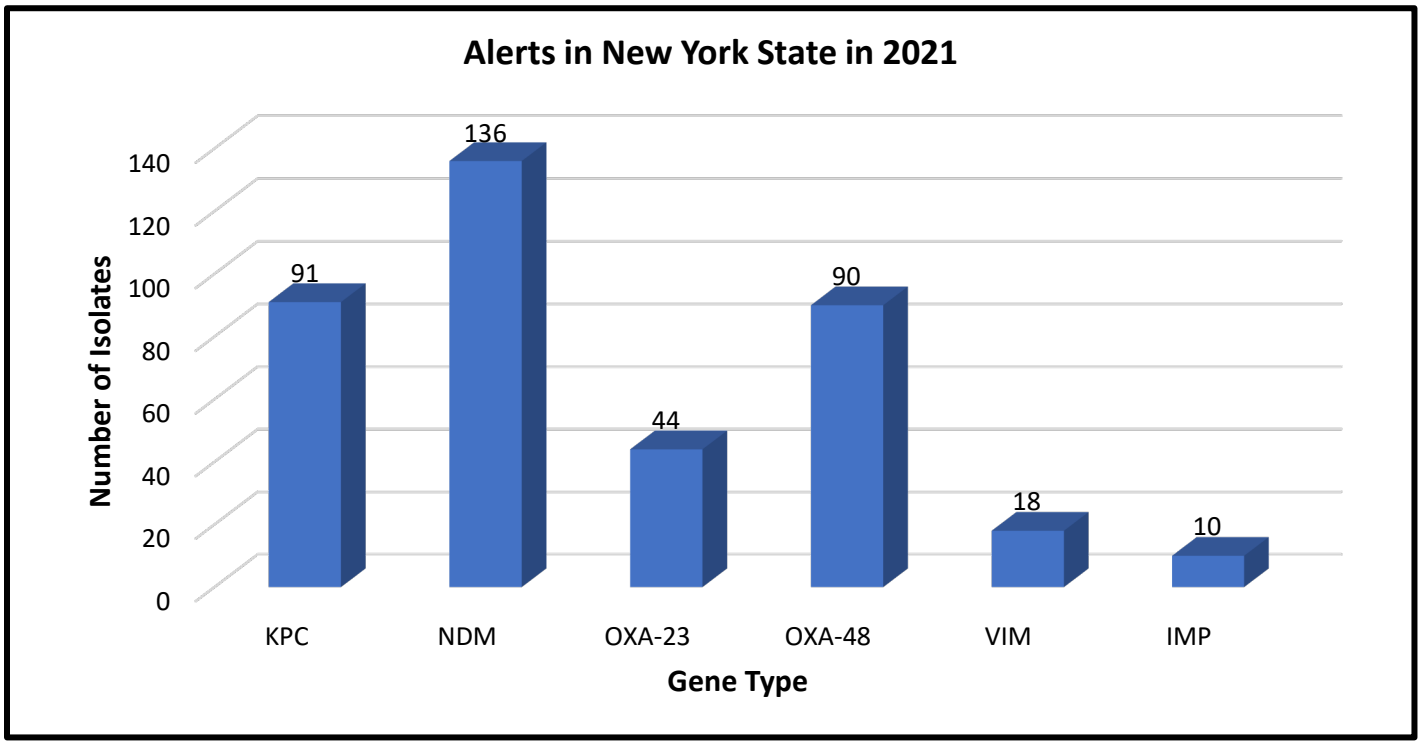

Figure 10. Number of isolate alerts reported to CDC from New York State.

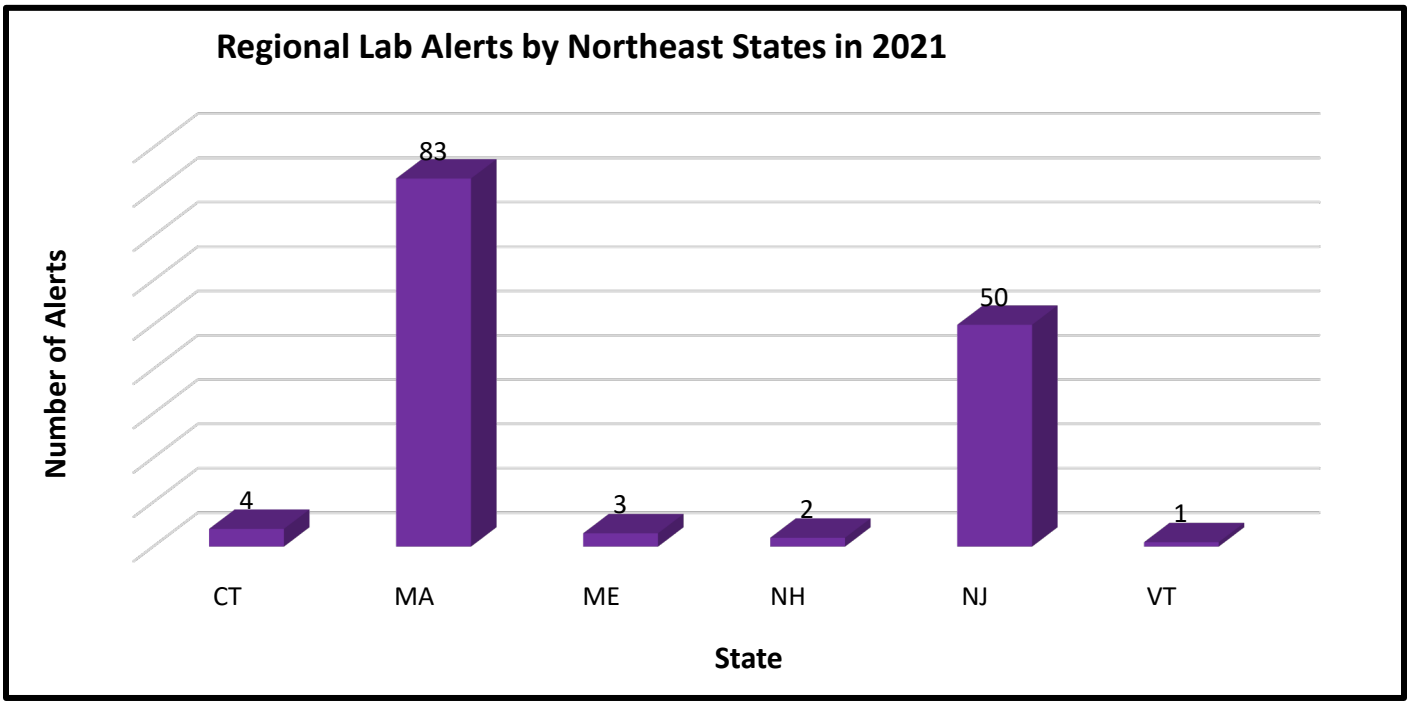

Figure 11. Alerts reported to CDC and NE State Epidemiologists from Regional Lab testing.

Recent Advisory

NEW YORK STATE OF OPPORTUNITY. Department of Health

KATHY HOCHUL
Governor

MARY T. BASSETT, M.D., M.P.H.
Commissioner

KRISTIN M. PROUD
Acting Executive Deputy Commissioner

Date: November 29, 2022

To: Clinical Laboratories, Commercial Laboratories, Hospitals, and Local Health Departments

From: Wadsworth Center and New York State Department of Health (NYSDOH) Bureau of Healthcare-Associated Infections

HEALTH ADVISORY: REQUEST FOR ISOLATES

Verona Integron-mediated Metallo-β-lactamase (VIM)-producing Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA)

Please distribute immediately to:
Laboratory Directors, Hospital Epidemiologists, Infection Preventionists, Infectious Disease Physicians, Medical Directors, and Nursing Directors

BACKGROUND AND SUMMARY

NYSDOH, in collaboration with the Centers for Disease Control and Prevention (CDC), is investigating cases of VIM-producing CRPA that belong to a multistate cluster. In addition to demonstrating carbapenem resistance, isolates in this cluster are not susceptible to ceftazidime or cefepime. Nationally, isolates have been identified from clinical cultures of sputum, urine, wounds, blood, and corneas, and from rectal swabs collected for surveillance since May 2022. These specimens were collected in both outpatient and inpatient healthcare settings. Isolates in this cluster are ST 1203, harbor bla_{VIM-80} and bla_{GES-9} (a combination not previously observed in the United States) and are closely related by whole genome sequencing analysis.

ISOLATES REQUESTED BY THE WADSWORTH CENTER – ANTIMICROBIAL RESISTANCE LABORATORY NETWORK

Please submit all *Pseudomonas aeruginosa* that are resistant to carbapenems (imipenem, meropenem, or doripenem) and not susceptible to cefepime or ceftazidime to Wadsworth Center for carbapenem resistance gene testing: https://www.cdc.gov/drugresistance/ar-lab-networks/domestic.html.

SUBMISSIONS

We understand that this is an additional effort for your laboratory. Wadsworth Center will provide a FedEx account to ship isolates free of charge. Please refer to the "Guidance for Antimicrobial Resistance Laboratory Network CRPA Isolate Submission to Wadsworth Center" document included.

CONTACT INFORMATION

For questions or further information on isolate submission, please contact ARLNCORENY@health.ny.gov; 518-474-4177

Call for Cases: Multistate Cluster of Verona Integron-mediatedMetallo-ß-lactamase (VIM)-producing Carbapenem-resistant Pseudomonas aeruginosa

Call for Cases: Multistate Cluster of Verona Integron-mediated Metallo-ß-lactamase (VIM)-producing Carbapenem-resistant Pseudomonas aeruginosa -- October 27, 2022

Access and Notification:	Click to see who has viewed this report.
Distribution: Contributor's instructions for distributing this report.	**Release outside of Epi-X as needed**
Brief Summary of Report:	The Centers for Disease Control and Prevention (CDC) is investigating a multistate cluster of VIM-producing carbapenem-resistant *Pseudomonas aeruginosa* (VIM-CRPA).
Description:	The Centers for Disease Control and Prevention (CDC) is investigating a multistate cluster of VIM-producing carbapenem-resistant *Pseudomonas aeruginosa* (VIM-CRPA). In addition to demonstrating carbapenem resistance, isolates in this cluster are not susceptible to ceftazidime or cefepime; the subset of isolates that underwent antimicrobial susceptibility testing for ceftolozane-tazobactam were also not susceptible to this agent. Isolates in this cluster are ST 1203, harbor *bla*VIM-80 and *bla*GES-9 (a combination not previously observed in the United States) and are closely related by whole genome sequencing (WGS) analysis. As of October 25, 2022, 34 isolates from 32 case-patients in 6 jurisdictions (CA, CT, NM, NY, UT, WA) have been identified; 28 isolates are part of 4 facility clusters. Dates of specimen collection are from May 2022 to present. Isolates have been identified from clinical cultures of sputum, urine, wounds, blood, and corneas, and from rectal swabs collected for surveillance. These specimens were collected in both outpatient and inpatient healthcare settings. There are no known epidemiological links between patients from different states. Investigations to identify common exposures among facilities with clusters of cases are underway. When *P. aeruginosa* are identified that are resistant to carbapenems (imipenem, meropenem, or doripenem) and not susceptible to cefepime or ceftazidime, clinical laboratories should consider submitting these isolates for carbapenem resistance mechanism testing. Carbapenem resistance mechanism testing is available through the Antimicrobial Resistance Laboratory Network. Due to the current multistate cluster, clinical laboratories that identify VIM-CRPA should save the isolate and report it to public health partners for potential further characterization. To discuss submission of isolates for mechanism testing or VIM-CRPA isolates for further characterization, reach out to your health department's healthcare-associated infections contact (https://www.cdc.gov/hai/state-based/index.html) or email haioutbreak@cdc.gov for assistance.
Category: Disease/Condition:	Biological (Bacterial) | Antimicrobial Resistance | Multidrug-Resistant Pseudomonas Aeruginosa
Type of Cases:	Human
Number of Cases:	Estimated Confirmed: 34 Deaths: 1
Cause/Agent:	VIM-producing Pseudomonas aeruginosa
Setting:	Health Care Facility
Location:	Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, New York City, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin,

	Wyoming, American Samoa, Commonwealth of the Marshall Islands, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Palau, Puerto Rico, US Virgin Islands
Public Health Actions Taken:	Investigation in Progress

Status Information

Contributor:	Marissa Grossman, MPH, PhD
Job Title:	EIS Officer
Employer:	CDC
Editor:	Kijafa Dickinson
Submitted:	10/27/2022 11:07AM
Posted:	10/27/2022 11:50AM
Comments:	No Comments Add Comments

View for Printing

RETROSPECTIVE ANALYSIS OF NE REGION AR LAB NETWORK WHOLE GENOME SEQUENCING DATA

Kate Prussing, Ph.D. – Research Scientist

Whole Genome Sequencing (WGS) is used by the AR Lab Network to obtain detailed information about CPOs, including an isolate's carbapenemase gene variant (for example, *bla*$_{KPC-2}$ vs. *bla*$_{KPC-3}$) and multi-locus sequence type (MLST). This information can be used for outbreak investigations, to determine how similar two isolates are to each other, and for surveillance, to monitor the frequency of carbapenemase gene variants and sequence types over space and time. We have been analyzing WGS data from over 1,700 CPOs sequenced at the Wadsworth Center and in Northeast Region states since 2017. This has allowed us to visualize trends, such as the relative frequencies of *bla*$_{NDM}$ gene variants across states (Figure 12), and of species-specific MLST sequence types (STs) across *bla*$_{NDM}$ gene variants (Figure 13). In the future, we plan to continue to monitor these data to provide increased context for WGS results from the Northeast Region.

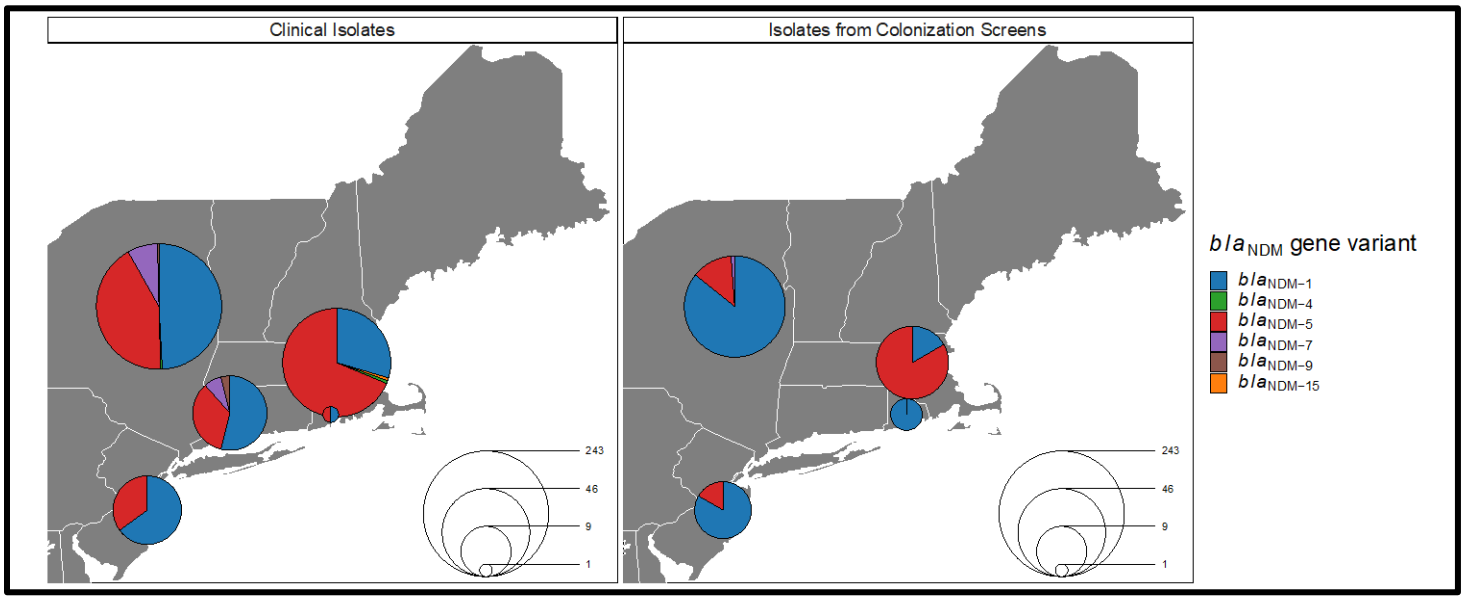

Figure 12: Frequency of *bla*$_{NDM}$ gene variants across Northeast Region states.

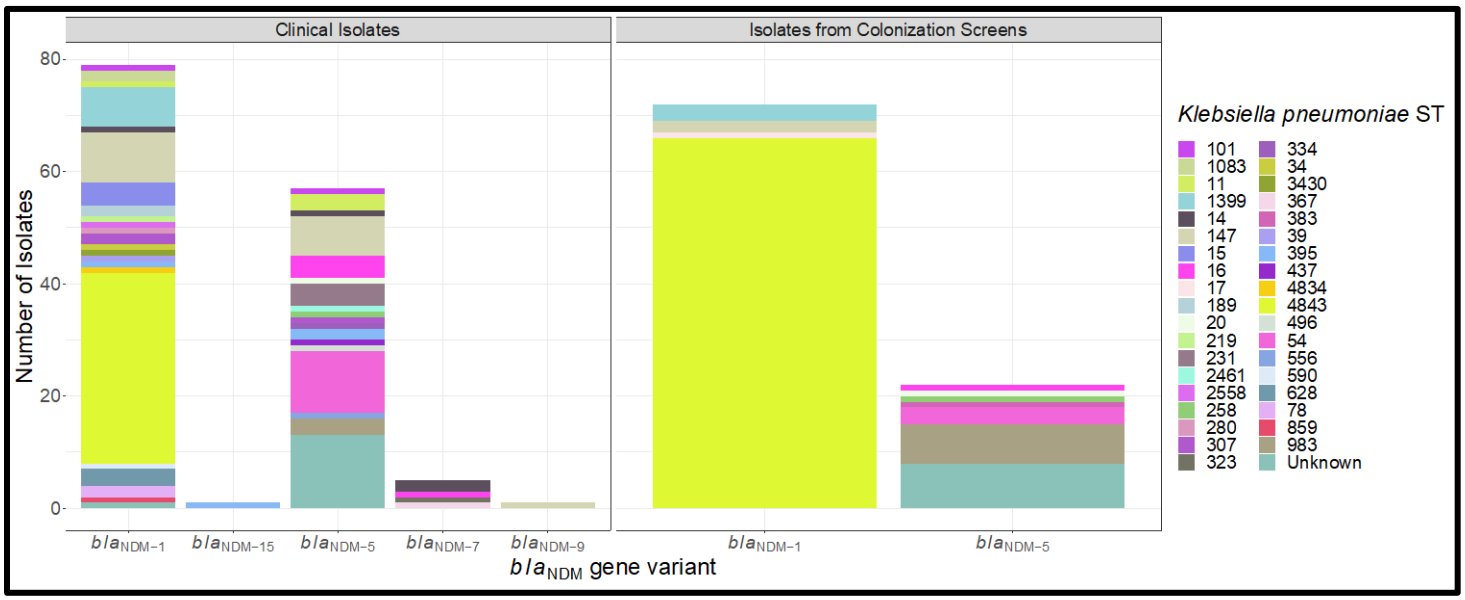

Figure 13: Frequency of *Klebsiella pneumoniae* MLST sequence type (ST) by *bla*$_{NDM}$ gene variant

***CANDIDA* SPECIES TESTING DATA AND ALERTS**

Mycology Laboratory Data

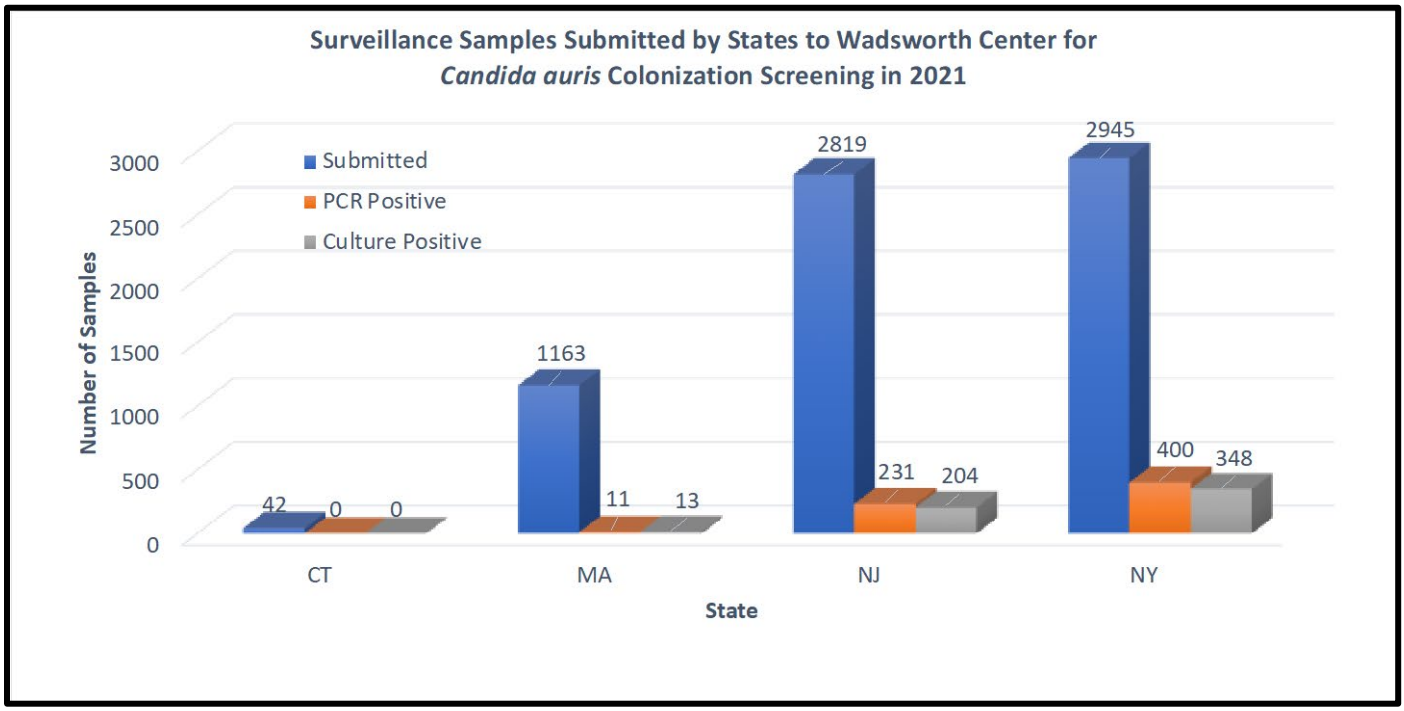

Figure 14 – Number of surveillance samples submitted by states for *C. auris* colonization.

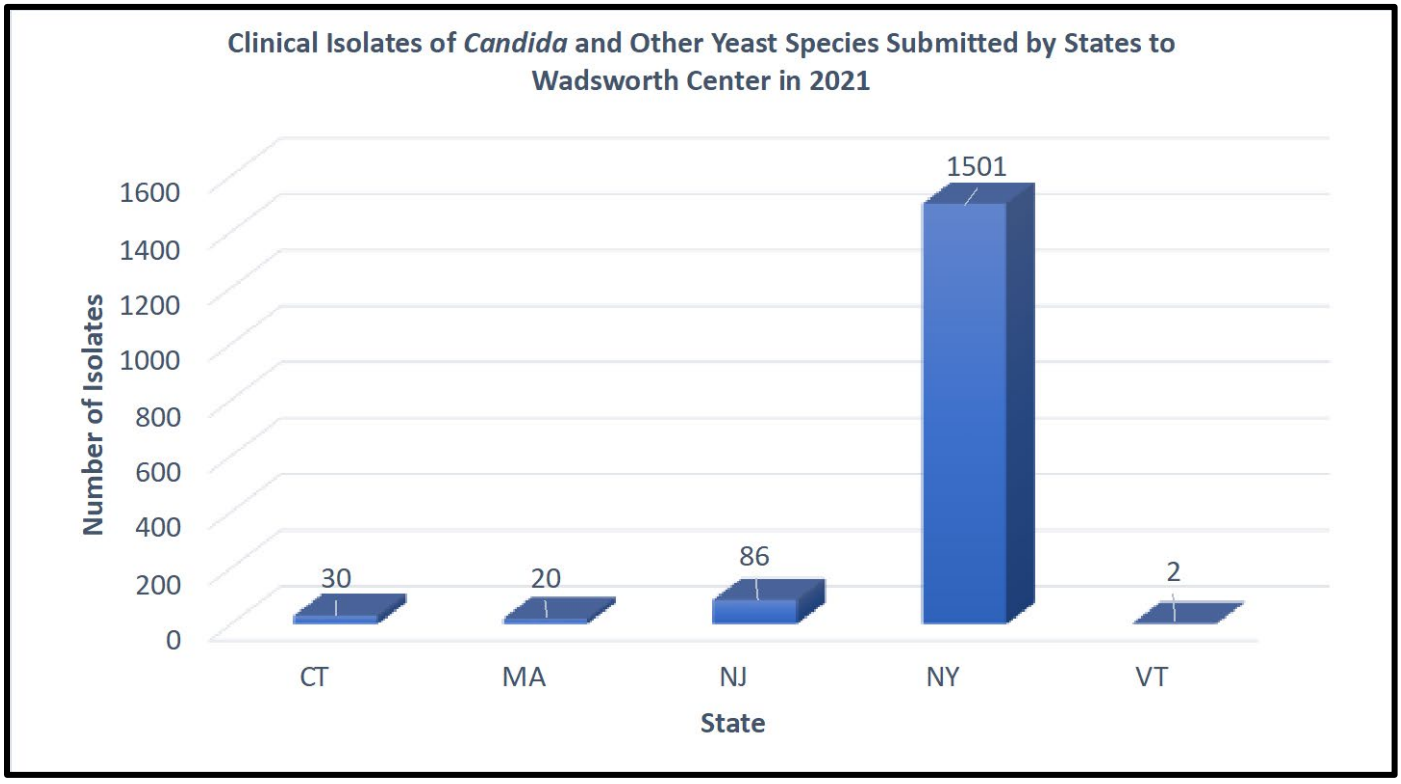

Figure 15 – Number of *Candida* and other yeast isolates submitted by states.

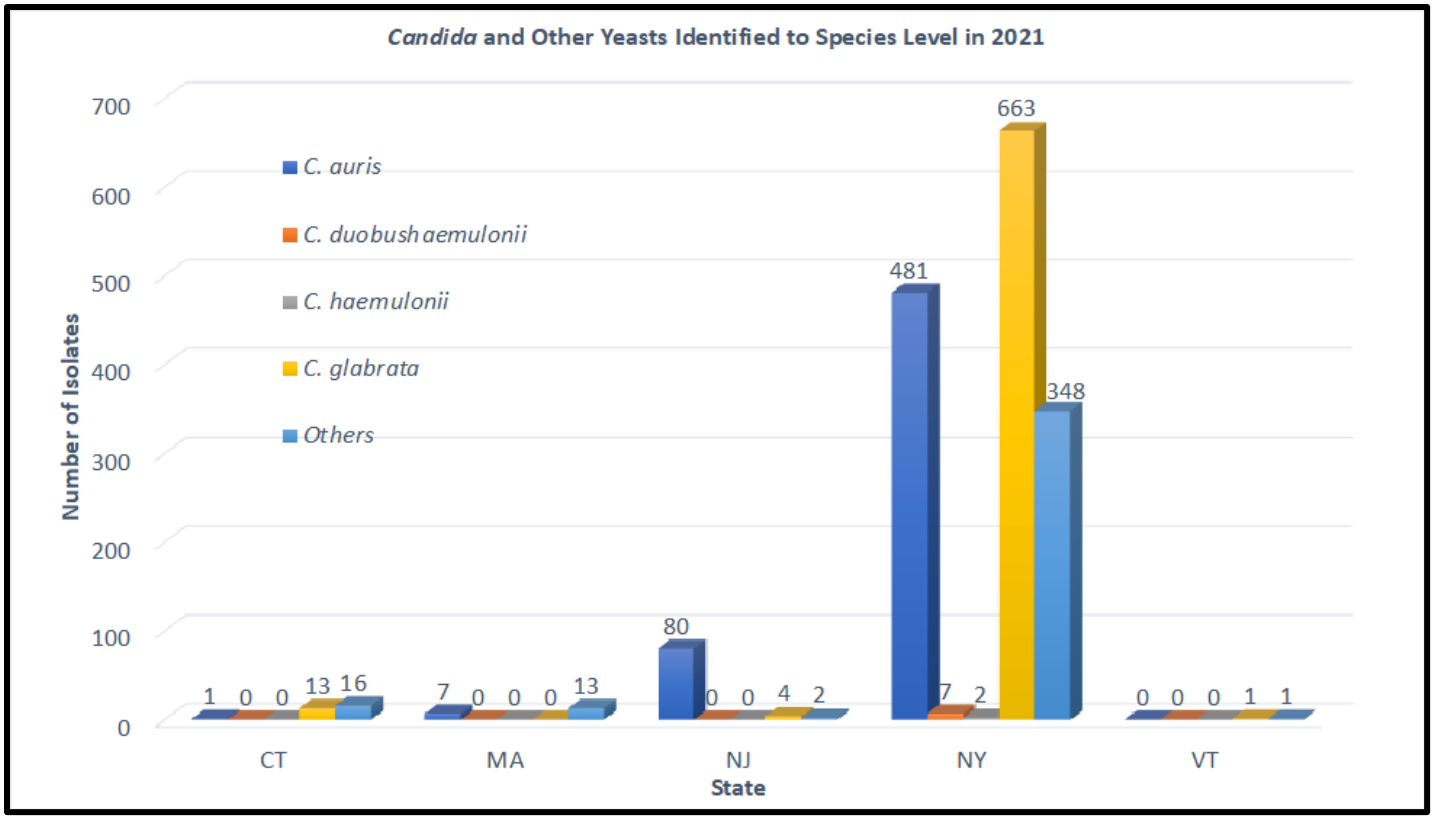

Figure 16 – Number of *Candida* and other yeast isolates submitted by states for species-level identification.

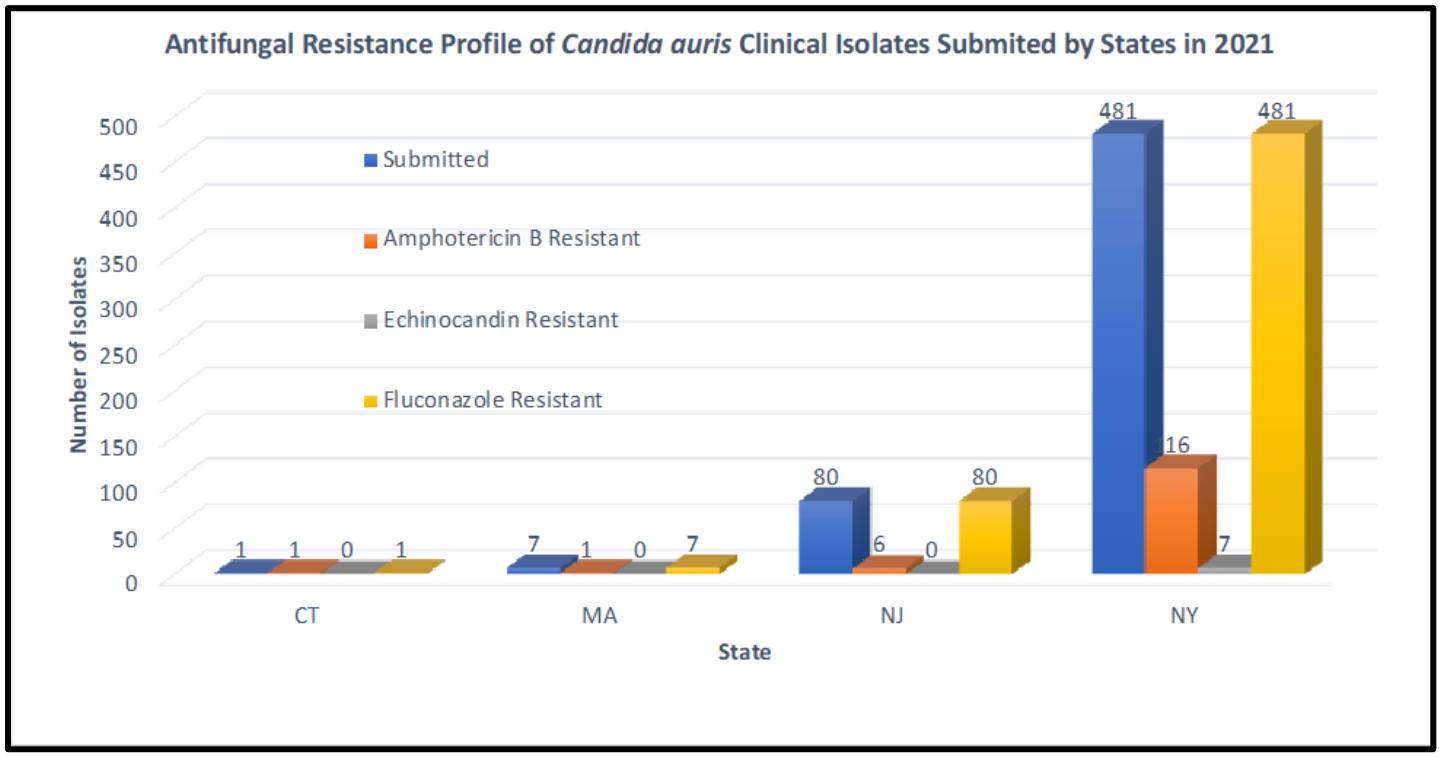

Figure 17 - Number of isolates exhibiting resistance to various antifungals were identified.

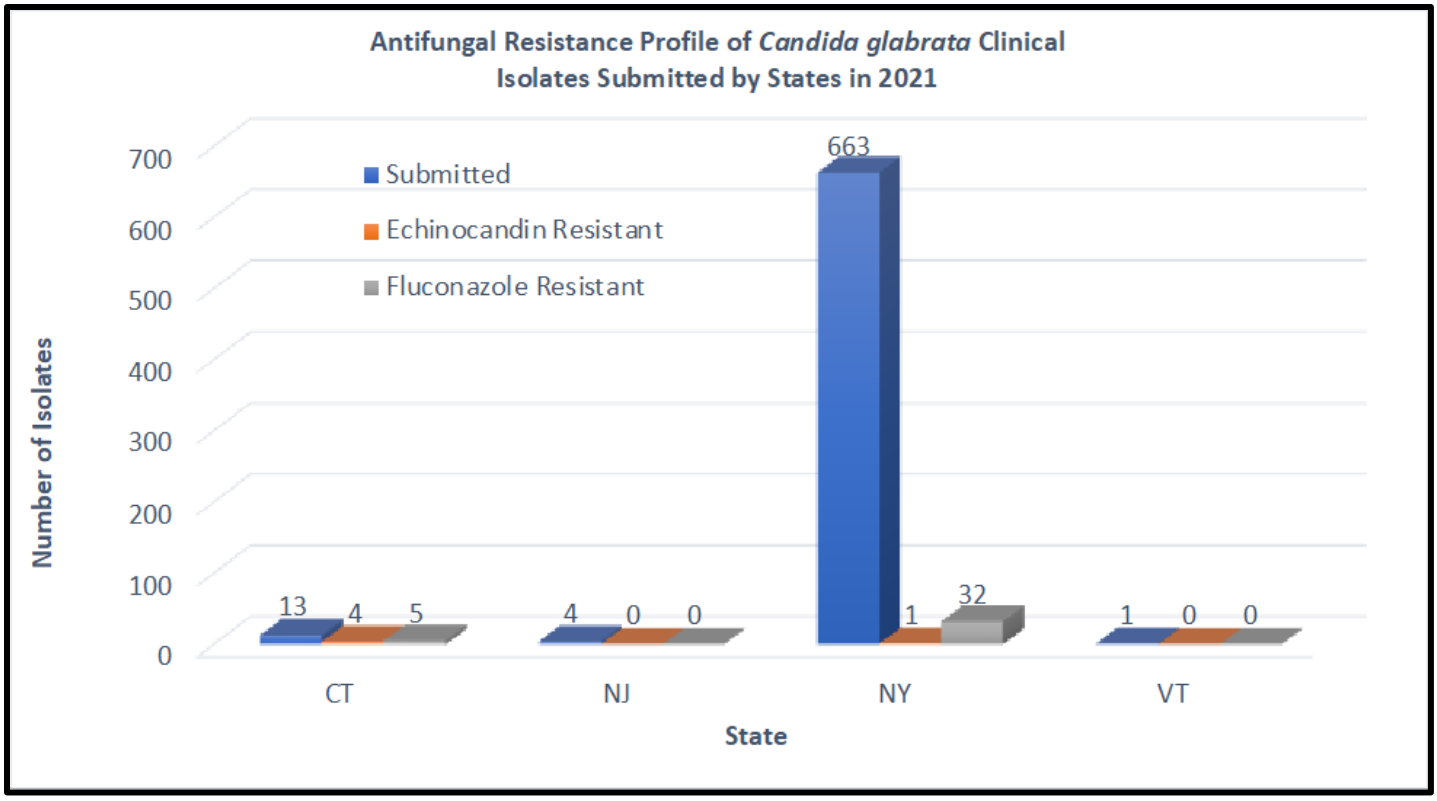

Figure 18 – Number of *C. glabrata* isolates exhibiting resistance against antifungals were identified.

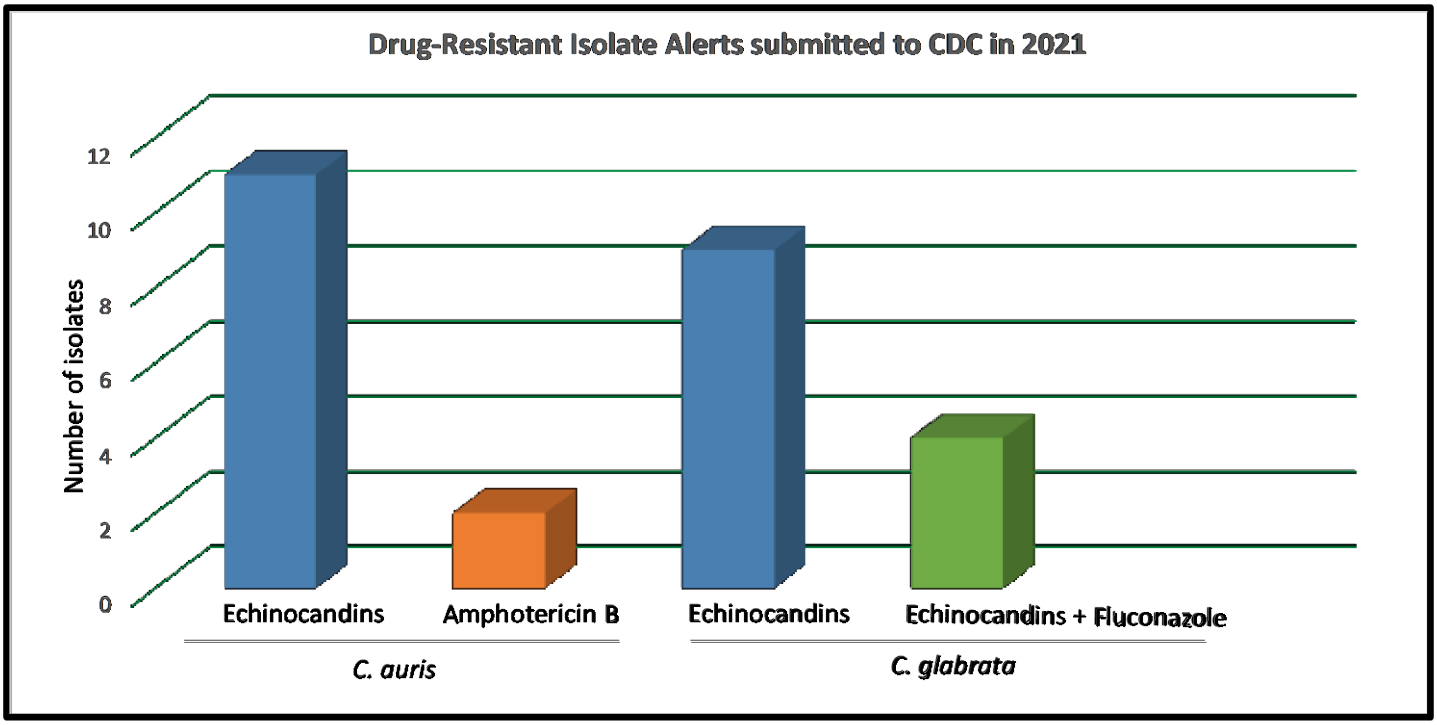

Figure 19 – Alerts pertaining to antifungal resistance submitted to CDC.

PUBLICATIONS ON *CANDIDA AURIS*

1. Marathe A, Zhu Y, Chaturvedi V, Chaturvedi S. Utility of CHROMagar™ Candida Plus for presumptive identification of *Candida auris* from surveillance samples. Mycopathologia. 2022 Dec;187(5-6):527-534. doi: 10.1007/s11046-022-00656-3. Epub 2022 Nov 10. PubMed PMID: 36355325; PubMed Central PMCID: PMC9647746.
2. Jacobs SE, Jacobs JL, Dennis EK, Taimur S, Rana M, Patel D, Gitman M, Patel G, Schaefer S, Iyer K, Moon J, Adams V, Lerner P, Walsh TJ, Zhu Y, Anower MR, Vaidya MM, Chaturvedi S, Chaturvedi V. *Candida auris* Pan-Drug-Resistant to Four Classes of Antifungal Agents. Antimicrob Agents Chemother. 2022 Jul 19;66(7):e0005322. doi: 10.1128/aac.00053-22. Epub 2022 Jun 30. PubMed PMID: 35770999; PubMed Central PMCID: PMC9295560.
3. Kilburn S, Innes G, Quinn M, Southwick K, Ostrowsky B, Greenko JA, Lutterloh E, Greeley R, Magleby R, Chaturvedi V, Chaturvedi S. Antifungal Resistance Trends of *Candida auris* Clinical Isolates in New York and New Jersey from 2016 to 2020. Antimicrob Agents Chemother. 2022 Mar 15;66(3):e0224221. doi: 10.1128/aac.02242-21. Epub 2022 Jan 10. PubMed PMID: 35007140; PubMed Central PMCID: PMC8923207.
4. Freitas BL, Leach L, Chaturvedi V, Chaturvedi S. Reverse Transcription-Quantitative Real-Time PCR (RT-qPCR) Assay for the Rapid Enumeration of Live *Candida auris* Cells from the Health Care Environment. J Clin Microbiol. 2022 Feb 16;60(2):e0077921. doi: 10.1128/JCM.00779-21. Epub 2021 Dec 8. PubMed PMID: 34878804; PubMed Central PMCID: PMC8849214.
5. Mirchin R, Czeresnia JM, Orner EP, Chaturvedi S, Murphy K, Nosanchuk JD. The Continuing Emergence of *Candida blankii* as a Pathogenic Fungus: A New Case of Fungemia in a Patient Infected with SARS-CoV-2. J Fungi (Basel). 2022 Feb 9;8(2). doi: 10.3390/jof8020166. PubMed PMID: 35205920; PubMed Central PMCID: PMC8878287.
6. Karmarkar EN, O'Donnell K, Prestel C, Forsberg K, Gade L, Jain S, Schan D, Chow N, McDermott D, Rossow J, Toda M, Ruiz R, Hun S, Dale JL, Gross A, Maruca T, Glowicz J, Brooks R, Bagheri H, Nelson T, Gualandi N, Khwaja Z, Horwich-Scholefield S, Jacobs J, Cheung M, Walters M, Jacobs-Slifka K, Stone ND, Mikhail L, Chaturvedi S, Klein L, Vagnone PS, Schneider E, Berkow EL, Jackson BR, Vallabhaneni S, Zahn M, Epson E. Rapid Assessment and Containment of *Candida auris* Transmission in Postacute Care Settings-Orange County, California, 2019. Ann Intern Med. 2021 Nov;174(11):1554-1562. doi: 10.7326/M21-2013. Epub 2021 Sep 7. PubMed PMID: 34487450.
7. Dennis EK, Chaturvedi S, Chaturvedi V. So Many Diagnostic Tests, So Little Time: Review and Preview of *Candida auris* Testing in Clinical and Public Health Laboratories. Front Microbiol. 2021;12:757835. doi: 10.3389/fmicb.2021.757835. eCollection 2021. Review. PubMed PMID: 34691009; PubMed Central PMCID: PMC8529189.

PRESENTATIONS ON CANDIDA AURIS

1. YanChun Zhu, (Supervisor, Mycology Laboratory Wadsworth Center, NYSDOH), presented alongside Jennifer Dale (Minnesota Department of Health Public Health Laboratory) and Joe Sexton (Mycotic Diseases Branch Laboratory Team Lead, Centers for Disease Control and Prevention) on 2/23/2023 in the *"Candida auris* Training Series" hosted by APHL. The session was titled "Implementation and Validation of *Candida auris* PCR" and presentations included the advantages of performing molecular assays, potential platforms, methods, and review of available resources for assay validation.

2. Dr. Sudha Chaturvedi and YanChun Zhu attended the APHL AR Lab Network Regional Laboratories in-person workshop with CDC on the colonization screening and antifungal susceptibility testing of *Candida auris*. Dr. Sudha Chaturvedi and YanChun Zhu briefed about the update of *Candida auris* testing capabilities in the state public health laboratories in the northeast region. Another discussion point was how to implement the extended panel of antifungal drugs in the regional laboratories.

3. Dr. Sudha Chaturvedi was invited by APHL to speak on 'Public Health Response to Multidrug-Resistant *Candida auris*' at the NACMID meeting, held in Portsmouth, NH from September 11-13, 2022.

4. Anuradha Marathe was chosen to give a talk on ChromAgar Candida Plus, a Novel Chromogenic Medium Providing Rapid Presumptive Identification of *Candida auris* for Resource-Limited Laboratories in the ASM Microbe Meeting held in Washington DC from 6/8 to 6/13, 2022

COLLABORATIONS

Mycology Laboratory collaborated with three commercial laboratories to bring about molecular test for rapid surveillance screening of multidrug-resistant *Candida auris.*

AR POSTER PRESENTATIONS

Md Rokebul Anower	Multidrug-resistant *Candida auris* Isolates from New York Outbreak Are Highly Virulent & Responsive to Antifungal Treatment in a *Galleria mellonella* Experimental Model	American Society for Microbiology (ASM) Microbe Conference; June 9-13, 2022; Washington D.C.
Janine Bodnar	Implementation of a Digital Imaging System for Reading and Interpretation of Broth Microdilution Antimicrobial Susceptibility Testing	American Society for Microbiology (ASM) Microbe Conference; June 9-13, 2022; Washington D.C.
Kailee Cummings	Molecular Detection of Emerging Carbapenemases from Rectal Swab Colonization Screenings in the Northeast	Association for Molecular Pathology Annual Meeting & Expo; November 1-5, 2022; Phoenix, AZ.
Mayuri Vaidya	Antifungal Susceptibility Profiles of Common and Rare Clinical *Candida* Species Collected 2017-2021, New York	Association of Public Health Laboratories Annual Conference; May 17-20, 2022; Cleveland, OH.
Kate Wahl	Comparative Analysis of Three Phenotypic Methods to Determine Metallo-B-lactamase Production in Carbapenemase-producing Enterobacterales and *Pseudomonas aeruginosa* Isolates	American Society for Microbiology (ASM) Microbe Conference; June 9-13, 2022; Washington D.C.
YanChun Zhu	Rapid Molecular Detection of Echinocandin-Resistance in *Candida auris*	Association of Public Health Laboratories Annual Conference; May 17-20, 2022; Cleveland, OH.