Nebraska Healthcare-Associated Infections and Antimicrobial Resistance (HAI/AR) Program Update - 2025

Muhammad Salman Ashraf, MBBS, FIDSA

Medical Director, Nebraska DHHS HAI/AR Program

Associate Professor, Division of Infectious Diseases, University of Nebraska Medical Center

Email: Salman.ashraf@nebraska.gov

@M-Salman-Ashraf.bsky.social

NEBRASKA
Good Life. Great Mission.
DEPT. OF HEALTH AND HUMAN SERVICES

DIVISION OF PUBLIC HEALTH

Disclosure

- Merck & Co. Inc – Principal Investigator for an investigator-initiated research grant focused on training consultant pharmacist in antibiotic stewardship implementation in LTCF

Objectives

Review trends in healthcare-associated infections and antimicrobial resistance (HAI/AR) in Nebraska

Identify opportunities for improvement in healthcare-associated infections and limiting spread of antimicrobial resistance

Discuss upcoming and ongoing projects focused on assisting healthcare facilities with their program improvements

Nebraska DHHS HAI/AR Program

State

Monitors HAI rates and AR data and keep facilities informed regarding progress and opportunities

Initial outbreak response/consultations

Assist facilities with data reporting and validations

Partners with stakeholders to drive changes focused on decreasing HAIs and AR

Academia

Partners with facilities to assess & advance their IC and AS programs on voluntary basis

Assist with IC assessment during outbreaks

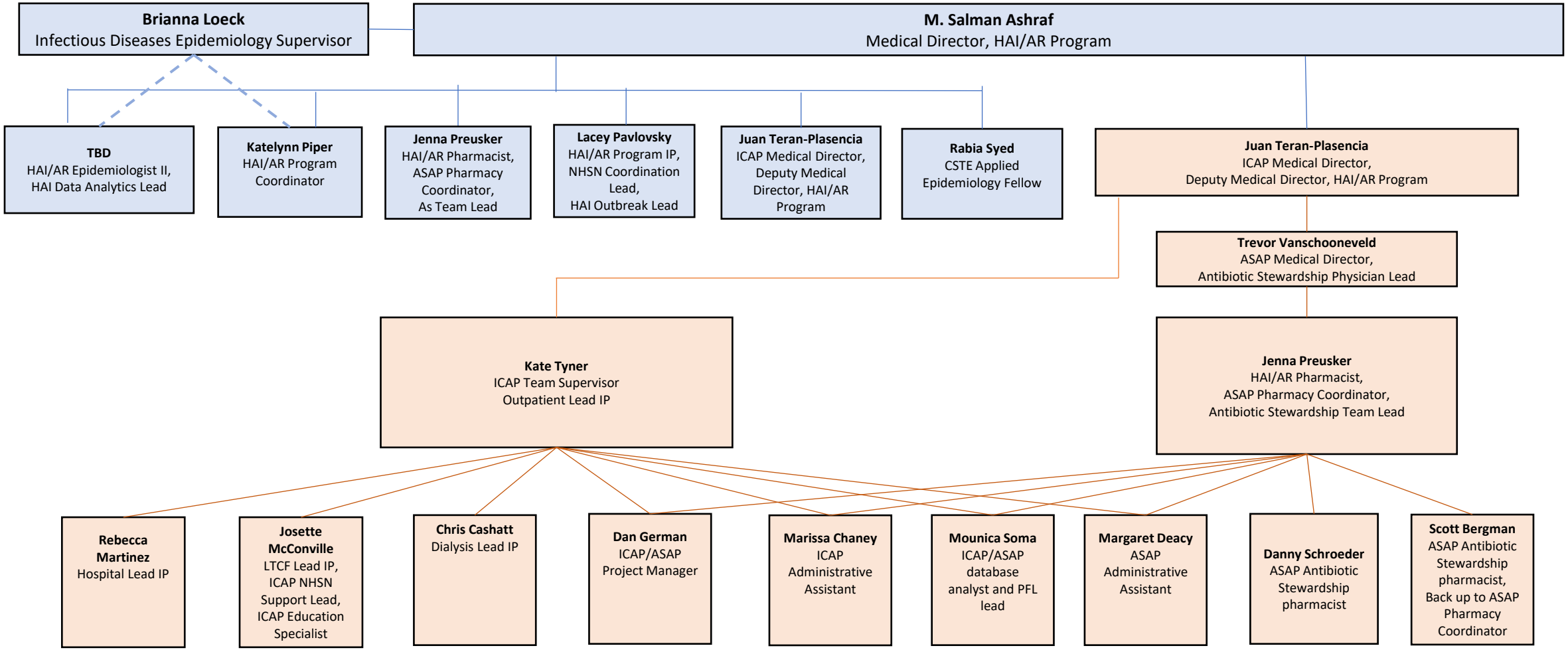
Connect all facilities in the state with IC and AS subject matter experts

Develop educational resources and guidance

PARTNERSHIP

- Nebraska Infection Control Assessment and Promotion Program (ICAP)
- Nebraska Antimicrobial Stewardship Assessment and Promotion Program (ASAP)

Nebraska DHHS HAI/AR Program

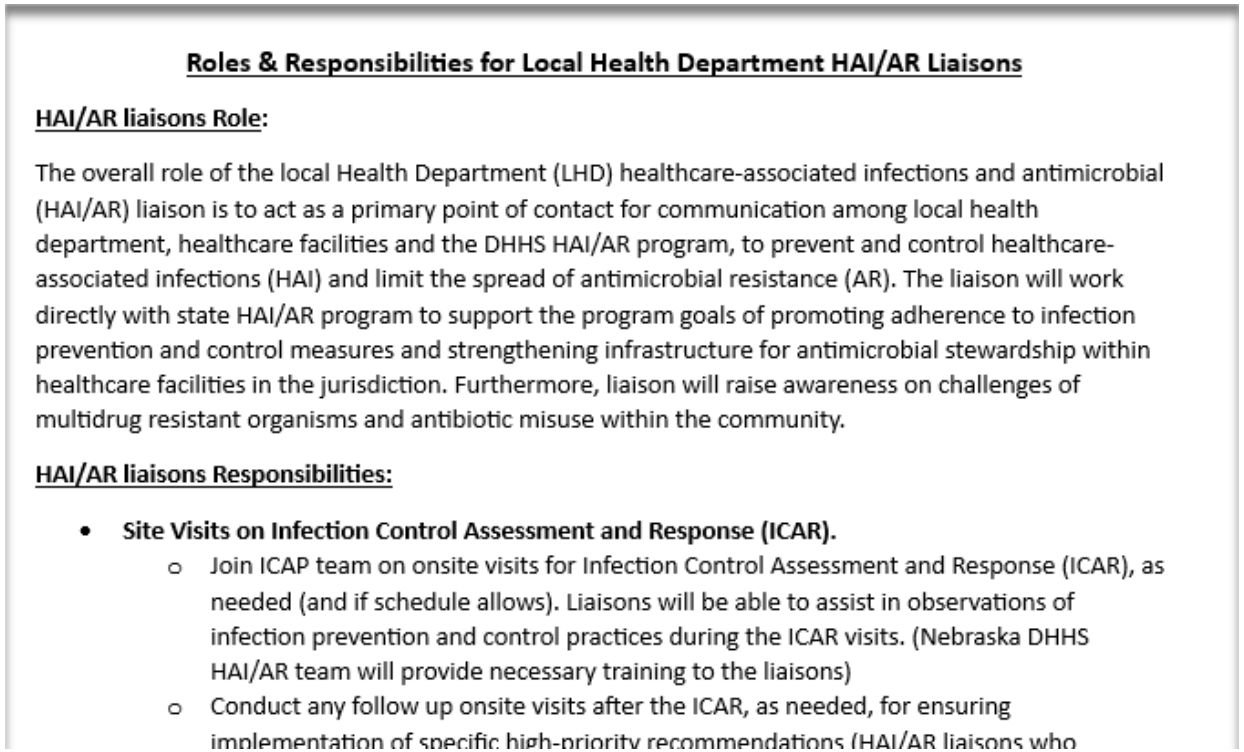


Notes:

1. This chart outlines the roles of HAI/AR program team members and represents day-to-day workflow. It does not reflect organizations' administrative reporting structure.
2. Administrative leaders for this collaboration are Sydney Stein, Robin Williams and Felicia Quintana-Zinn at NDHHS, David Warren at UNMC ID-Division and Angie Vasa at Nebraska Medicine
3. The chart only describes the primary responsibilities of the staff within HAI/AR program. Many staff members have secondary responsibilities of assisting other team members in their roles or may have additional responsibilities outside the HAI/AR program
4. Blue colored boxes identify staff with NDHHS credentials (either with or without additional responsibilities at ICAP or ASAP) and orange color boxes identify staff with primary responsibilities at ICAP, ASAP or both
5. HAI/AR Program IP also assist with some ICAP activities
6. HAI/AR Pharmacist /ASAP Pharmacy Coordinator is a split position with primary responsibilities at both DHHS and ASAP while Deputy Medical Director HAI/AR Program may assume primary responsibilities at both DHHS and ICAP/ASAP in the absence of HAI Program medical director
7. HAI/AR Program at DHHS is part of the Epidemiology Unit and reports to Epidemiologist Supervisor Brianna Loeck who also has direct supervising responsibility for HAI AR epidemiologist and HAI/AR program coordinator positions and support them, as necessary, with their daily responsibilities.

Roles and Responsibilities for LHD HAI/AR Liaisons

- Assisting with site visits on ICAR, as needed (and if schedule allows)
- Sharing educational messaging
- Monitoring and responding to HAI outbreaks or HAI/AR events in collaboration with DHHS HAI/AR program
- Communication and relationship building with healthcare facilities



Roles & Responsibilities for Local Health Department HAI/AR Liaisons

HAI/AR liaisons Role:

The overall role of the local Health Department (LHD) healthcare-associated infections and antimicrobial (HAI/AR) liaison is to act as a primary point of contact for communication among local health department, healthcare facilities and the DHHS HAI/AR program, to prevent and control healthcare-associated infections (HAI) and limit the spread of antimicrobial resistance (AR). The liaison will work directly with state HAI/AR program to support the program goals of promoting adherence to infection prevention and control measures and strengthening infrastructure for antimicrobial stewardship within healthcare facilities in the jurisdiction. Furthermore, liaison will raise awareness on challenges of multidrug resistant organisms and antibiotic misuse within the community.

HAI/AR liaisons Responsibilities:

- **Site Visits on Infection Control Assessment and Response (ICAR).**
  - Join ICAP team on onsite visits for Infection Control Assessment and Response (ICAR), as needed (and if schedule allows). Liaisons will be able to assist in observations of infection prevention and control practices during the ICAR visits. (Nebraska DHHS HAI/AR team will provide necessary training to the liaisons)
  - Conduct any follow up onsite visits after the ICAR, as needed, for ensuring implementation of specific high-priority recommendations (HAI/AR liaisons who

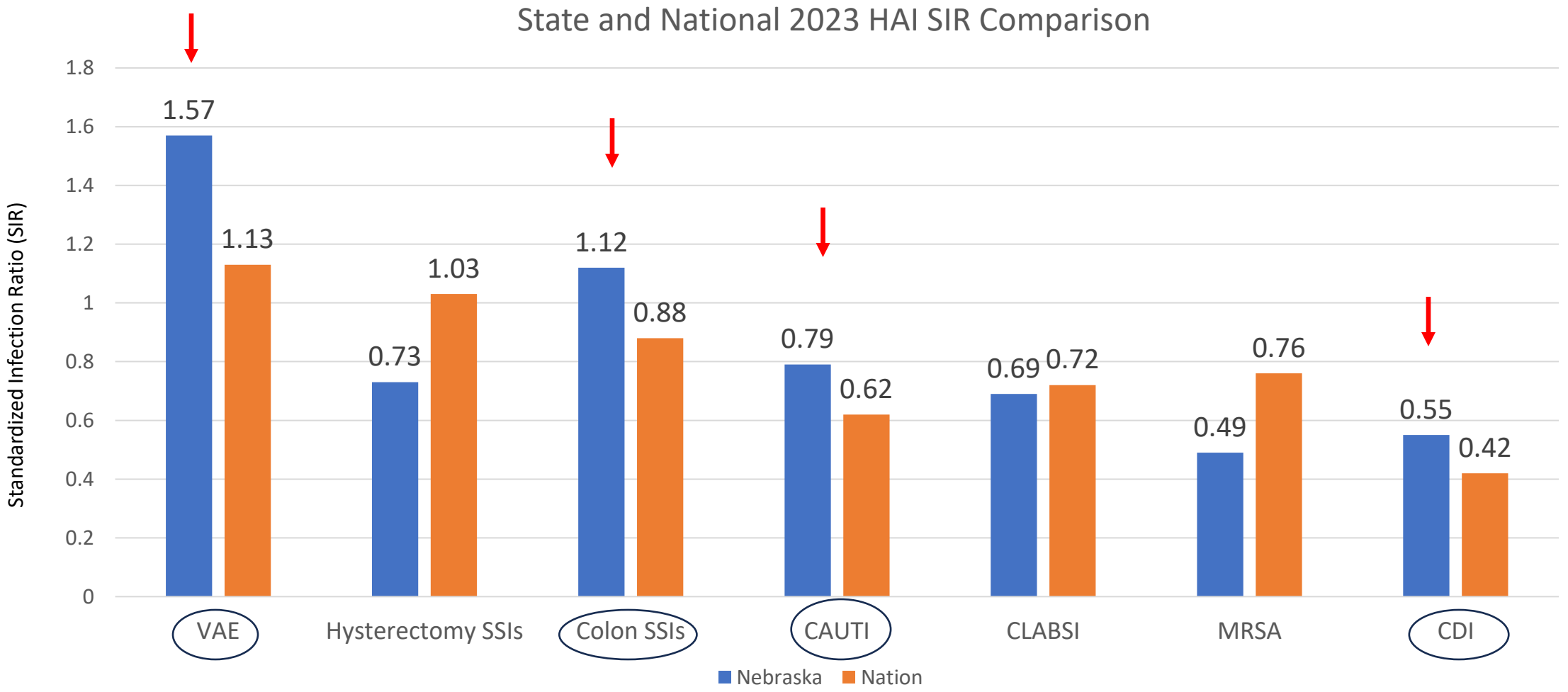
HAI/AR Program Focus Areas

- Healthcare-Associated Infections
  - CAUTI – Cather Associated Urinary Tract Infection
  - CLABSI – Central Line Associated Bloodstream Infection
  - SSI – Surgical Site Infections
  - CDI – *C. difficile* infections
  - MRSA bloodstream infections
  - VAE – Ventilator Associated Events
- Multidrug Resistant Organisms
  - CPO – Carbapenemase Producing Organisms
  - *Candida auris*
  - Other highly resistant or novel pathogens (e.g. CRE, CRPA, CRAB, VISA/VRSA etc.)
- Outbreak prevention and containment
  - Cluster or transmission associated with any organism in a healthcare setting
- Infection Control Assessment and Response (ICAR)
- Antimicrobial Stewardship (AS) Program Assessment and Response
- Education and Training (Including Project Firstline)

Includes Surveillance, Reporting and Technical Assistance

Includes Antibiotic Use Surveillance and Reporting

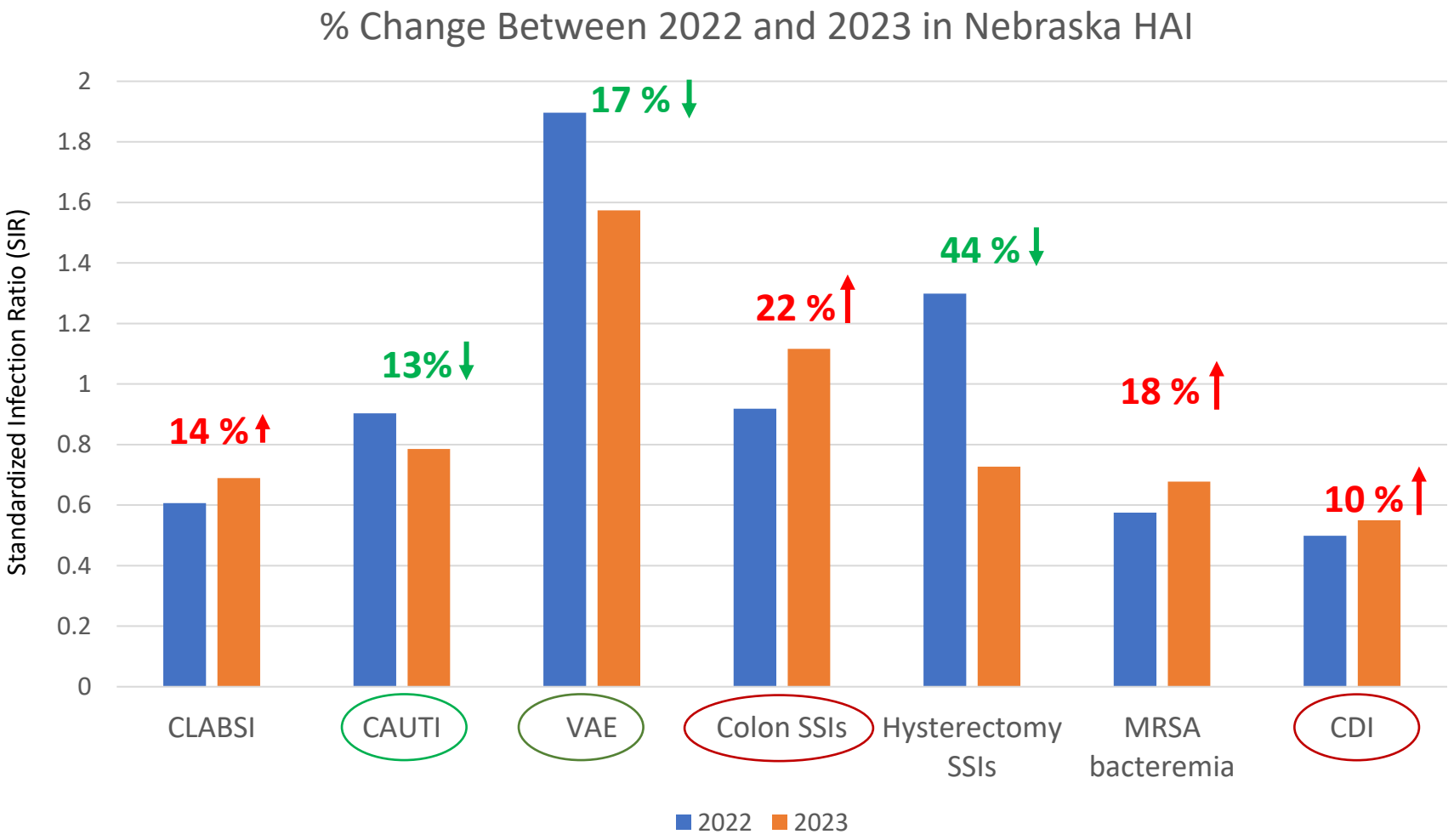
2023 HAI SIR: Nebraska Versus Nation



https://arpsp.cdc.gov/profile/geography/nebraska

NEBRASKA
Good Life. Great Mission.
DIVISION OF PUBLIC HEALTH

2022 National and State HAI Progress Report



HAI	% Change Nationally
CLABSI	15% decrease
CAUTI	11% decrease
VAE	15% decrease
Colon	No significant change
Hysterectomy	8% Increase
Hospital onset MRSA bacteremia	16% decrease
Hospital onset CDI	13% decrease

* Statistically significant change

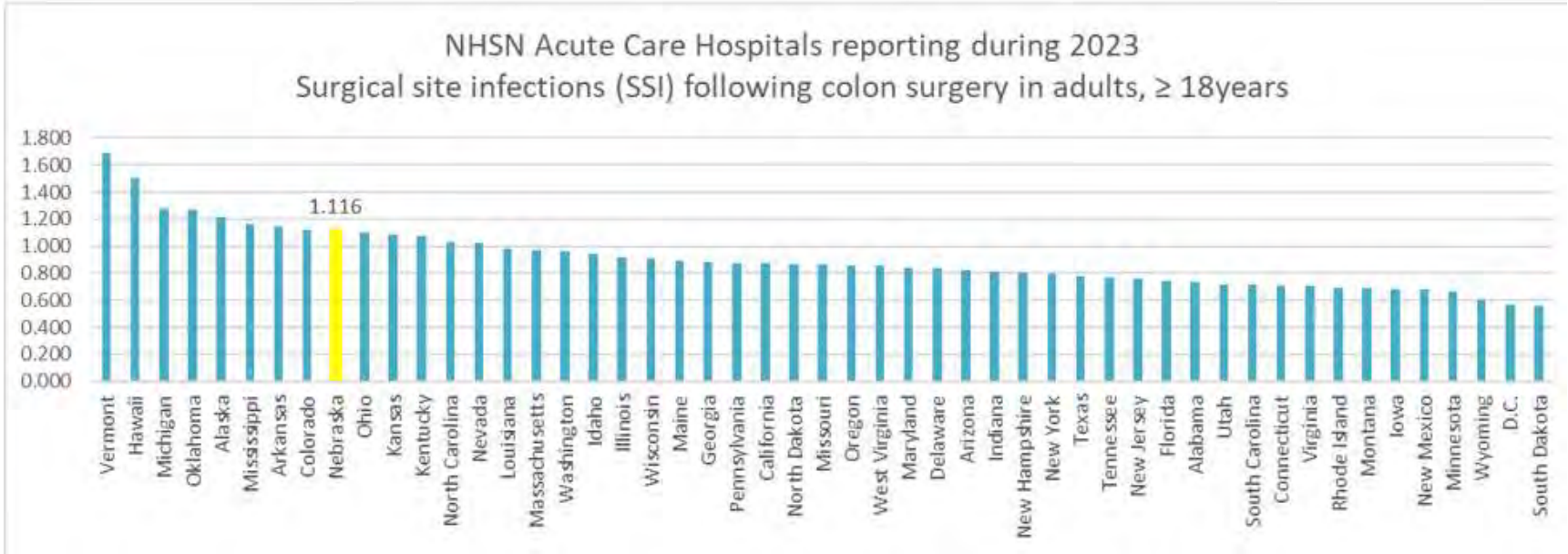
[Note: There was no statistically significant difference noted in any of the above-mentioned HAI from 2022 to 2023]

https://www.cdc.gov/nhsn/datastat/progress-report.html#anchor_1700850695274
https://arpsp.cdc.gov/profile/geography/nebraska

NEBRASKA Good Life. Great Mission. DIVISION OF PUBLIC HEALTH

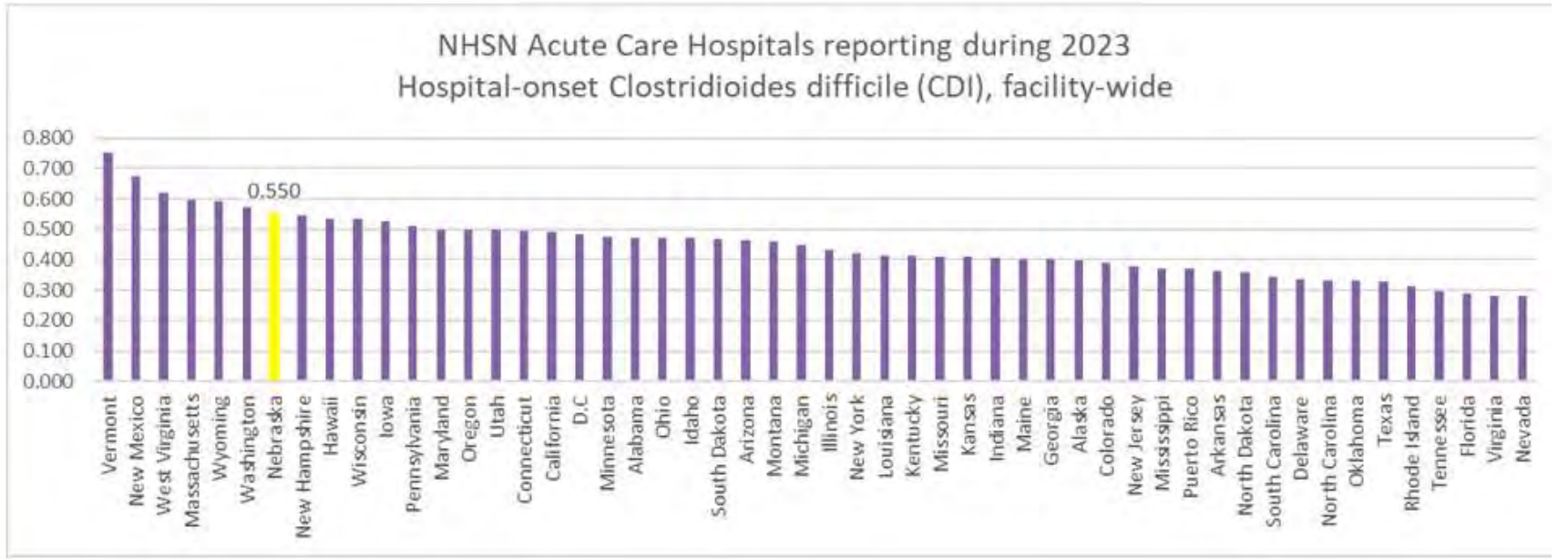
Colon Surgery

Nebraska **ranked 43rd** (n=51) for Surgical Site Infections following Colon Surgeries in 2023.

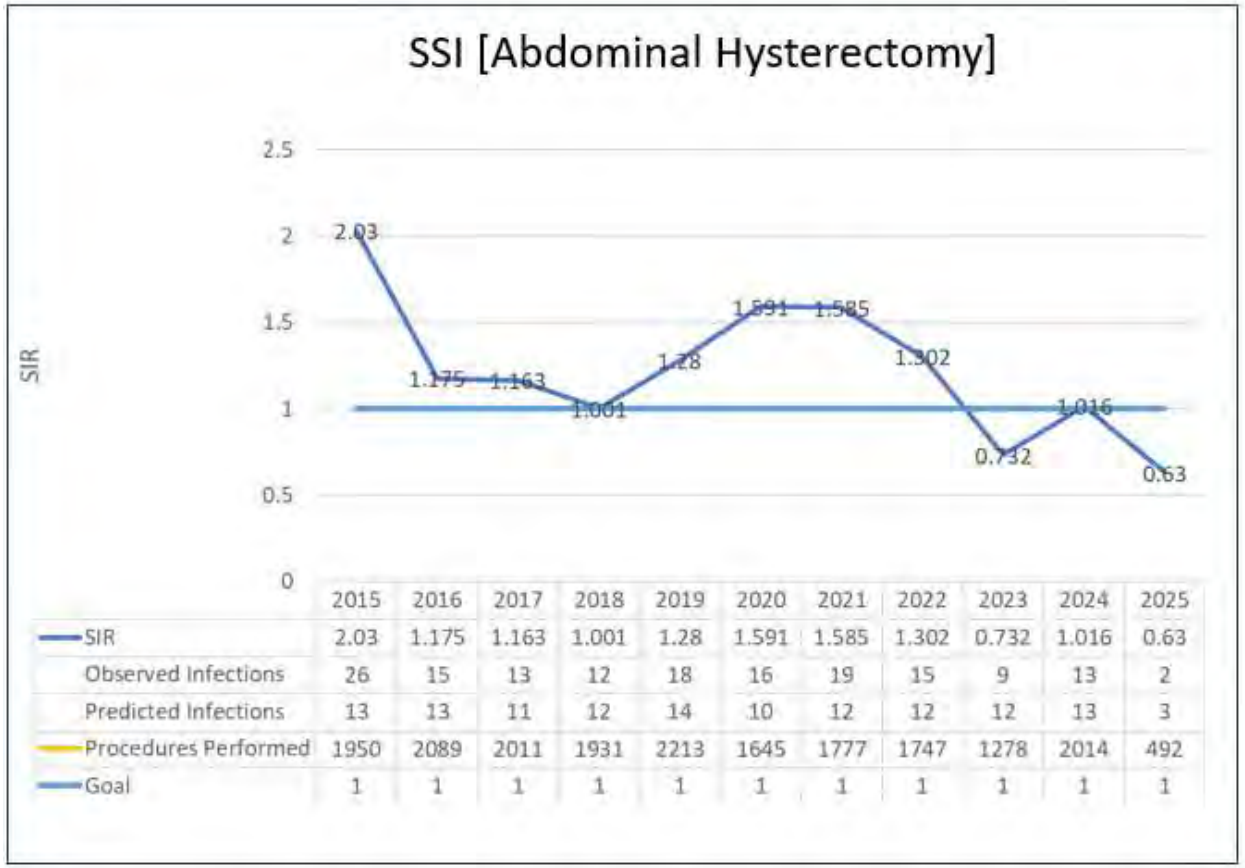


Acute Care Hospital-onset *Clostridioides difficile* (CDI), facility-wide

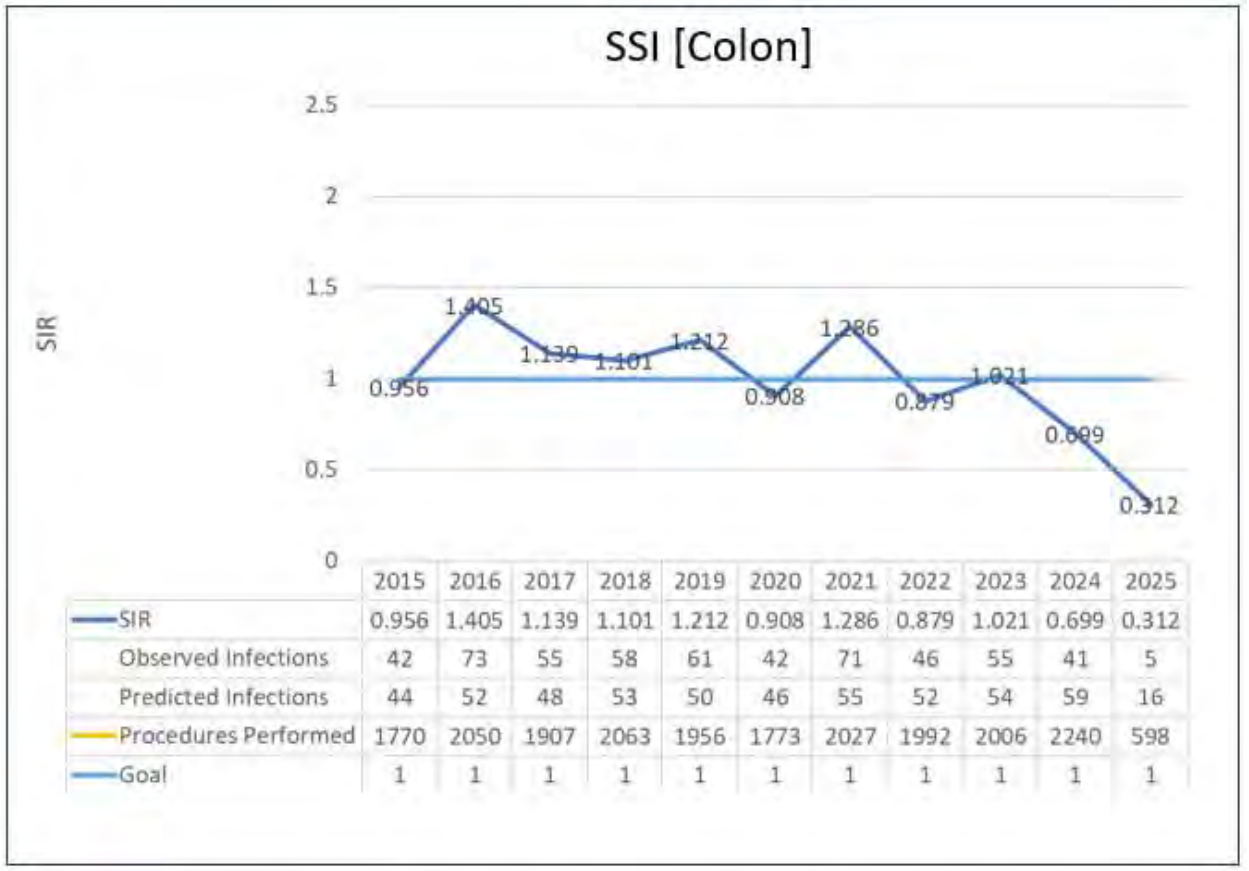
Nebraska **ranked 46th** (n=52) for Hospital-onset Clostridioides difficile (CDI), facility-wide in 2023.



Healthcare-Associated Infections – Nebraska 2015-2025



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	2.03	1.175	1.163	1.001	1.28	1.591	1.585	1.302	0.732	1.016	0.63
Observed Infections	26	15	13	12	18	16	19	15	9	13	2
Predicted Infections	13	13	11	12	14	10	12	12	12	13	3
Procedures Performed	1950	2089	2011	1931	2213	1645	1777	1747	1278	2014	492
Goal	1	1	1	1	1	1	1	1	1	1	1



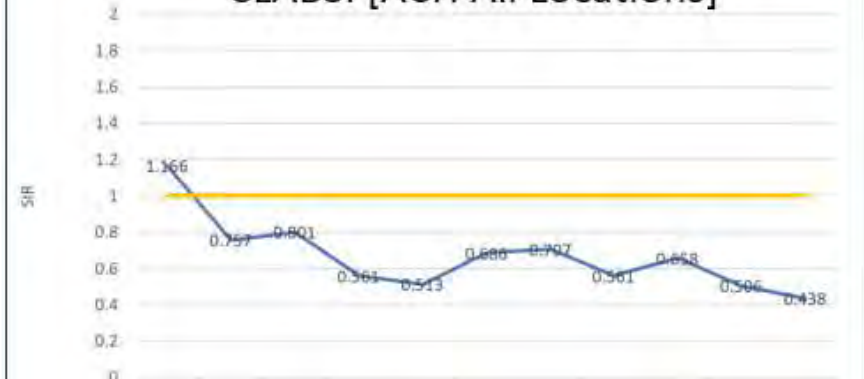
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	0.956	1.405	1.139	1.101	1.212	0.908	1.286	0.879	1.021	0.699	0.312
Observed Infections	42	73	55	58	61	42	71	46	55	41	5
Predicted Infections	44	52	48	53	50	46	55	52	54	59	16
Procedures Performed	1770	2050	1907	2063	1956	1773	2027	1992	2006	2240	598
Goal	1	1	1	1	1	1	1	1	1	1	1

2015-2023 Data Source: NHSN – Include acute care hospitals conferring rights to DHHS

2024-2025 Data Source- NHSN DUA Group

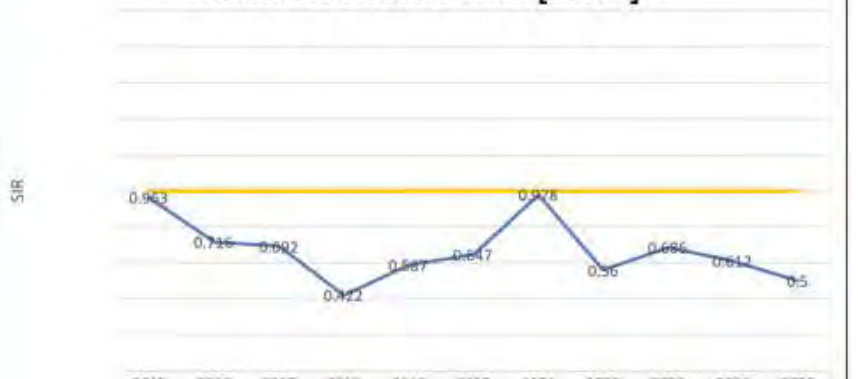
Healthcare-Associated Infections – Nebraska 2015-2025

CLABSI [ACH All Locations]



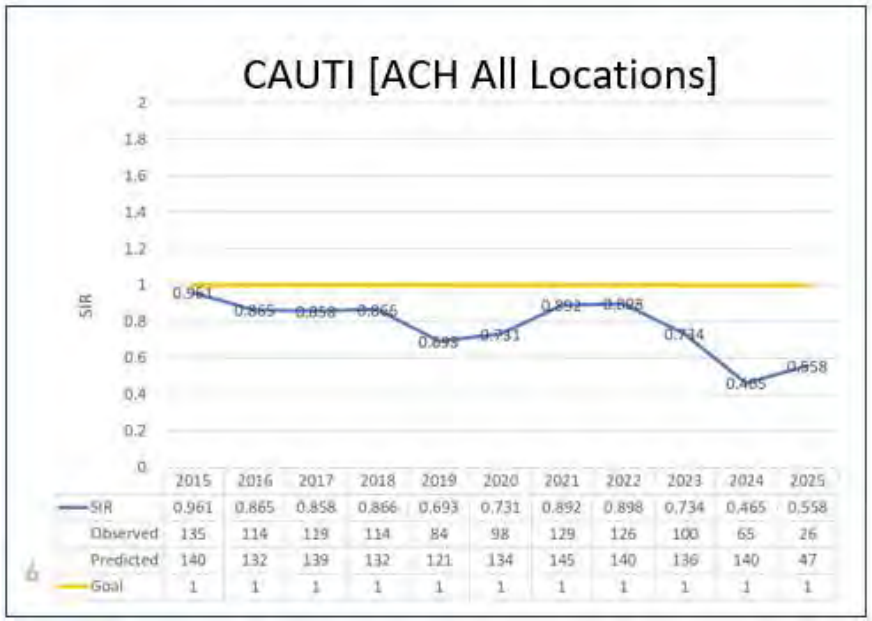
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	1.166	0.757	0.801	0.561	0.513	0.686	0.707	0.561	0.658	0.506	0.438
Observed	186	119	124	88	80	103	112	85	99	86	24
Predicted	159	157	155	157	156	150	158	152	106	170	55
Goal	1	1	1	1	1	1	1	1	1	1	1

MRSA Bacteremia [ACH]



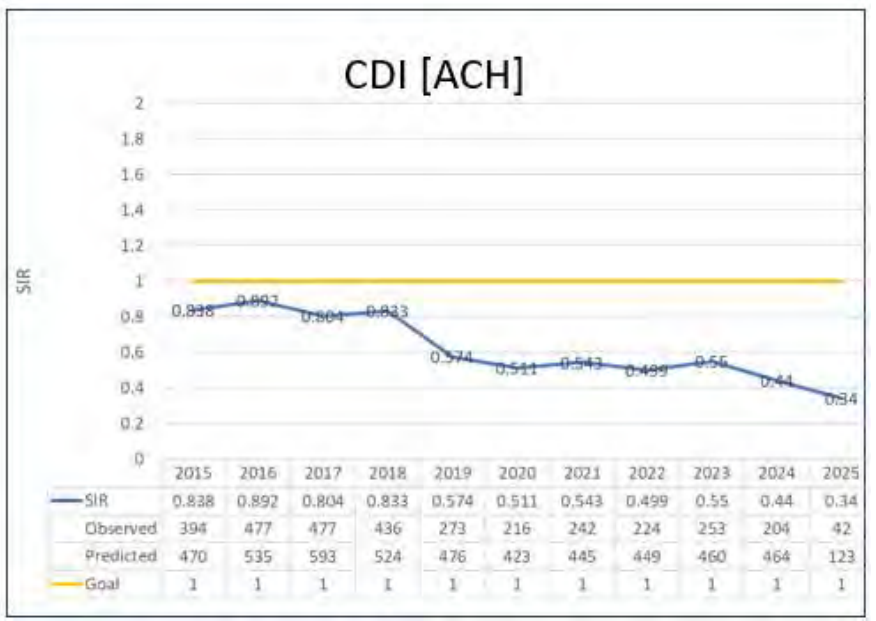
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	0.963	0.716	0.692	0.422	0.587	0.647	0.978	0.56	0.686	0.612	0.5
Observed	44	35	36	23	32	34	53	33	38	33	10
Predicted	46	49	52	55	55	53	54	59	55	54	20
Goal	1	1	1	1	1	1	1	1	1	1	1

CAUTI [ACH All Locations]



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	0.961	0.865	0.858	0.866	0.693	0.731	0.892	0.898	0.734	0.465	0.558
Observed	135	114	119	114	84	98	129	126	100	65	26
Predicted	140	132	139	132	121	134	145	140	136	140	47
Goal	1	1	1	1	1	1	1	1	1	1	1

CDI [ACH]



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	0.838	0.892	0.804	0.833	0.574	0.511	0.543	0.499	0.55	0.44	0.34
Observed	394	477	477	436	273	216	242	224	253	204	42
Predicted	470	535	593	524	476	423	445	449	460	464	123
Goal	1	1	1	1	1	1	1	1	1	1	1

*2025 Data is for January 2025-April 2025

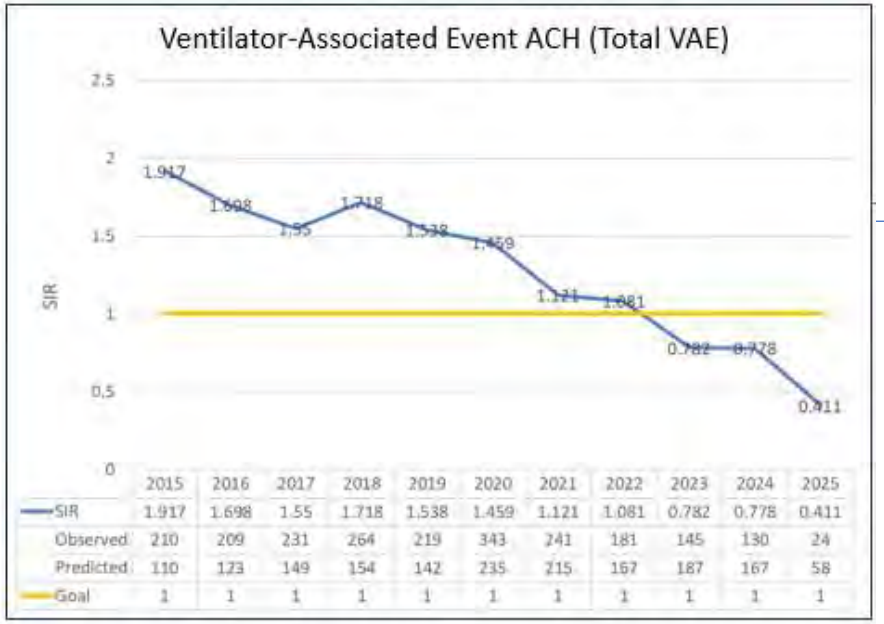
2015-2023 Data Source: NHSN – Include acute care hospitals conferring rights to DHHS

2024-2025 Data Source- NHSN DUA Group

NEBRASKA
Good Life. Great Mission.

DIVISION OF PUBLIC HEALTH

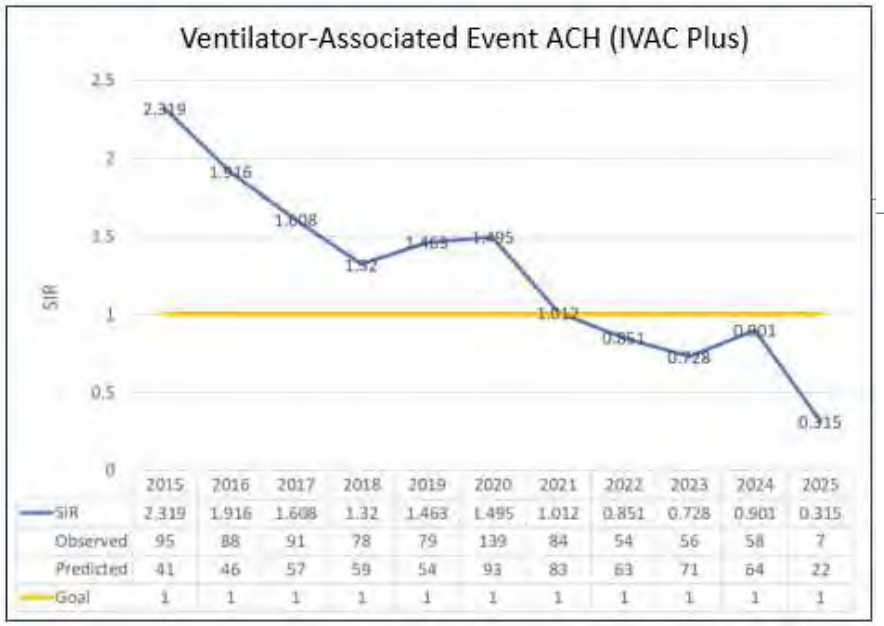
Healthcare-Associated Infections – Nebraska 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	1.917	1.698	1.55	1.718	1.538	1.459	1.121	1.081	0.782	0.778	0.411
Observed	210	209	231	264	219	343	241	181	145	130	24
Predicted	110	123	149	154	142	235	215	167	187	167	58
Goal	1	1	1	1	1	1	1	1	1	1	1

Includes Ventilator-Associated Conditions (VAC),Infection Related Ventilator Associated Complications (IVAC) and Possible Ventilator Associated Pneumonia (PVAP)

At least 2 days of stability followed by increased in PEEP or FiO2 will be needed for condition to be considered as VAE



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR	2.319	1.916	1.608	1.32	1.463	1.495	1.012	0.851	0.728	0.901	0.315
Observed	95	88	91	78	79	139	84	54	56	58	7
Predicted	41	46	57	59	54	93	83	63	71	64	22
Goal	1	1	1	1	1	1	1	1	1	1	1

Includes Infection Related Ventilator Associated Complications (IVAC) and Possible Ventilator Associated Pneumonia (PVAP)

In addition to minimum criteria mentioned for VAE, there needs to be a new antibiotic started along with change in WBC or Temperature

2015-2023 Data Source: NHSN – Include acute care hospitals conferring rights to DHHS.
2024-2025 Data Source- NHSN DUA Group

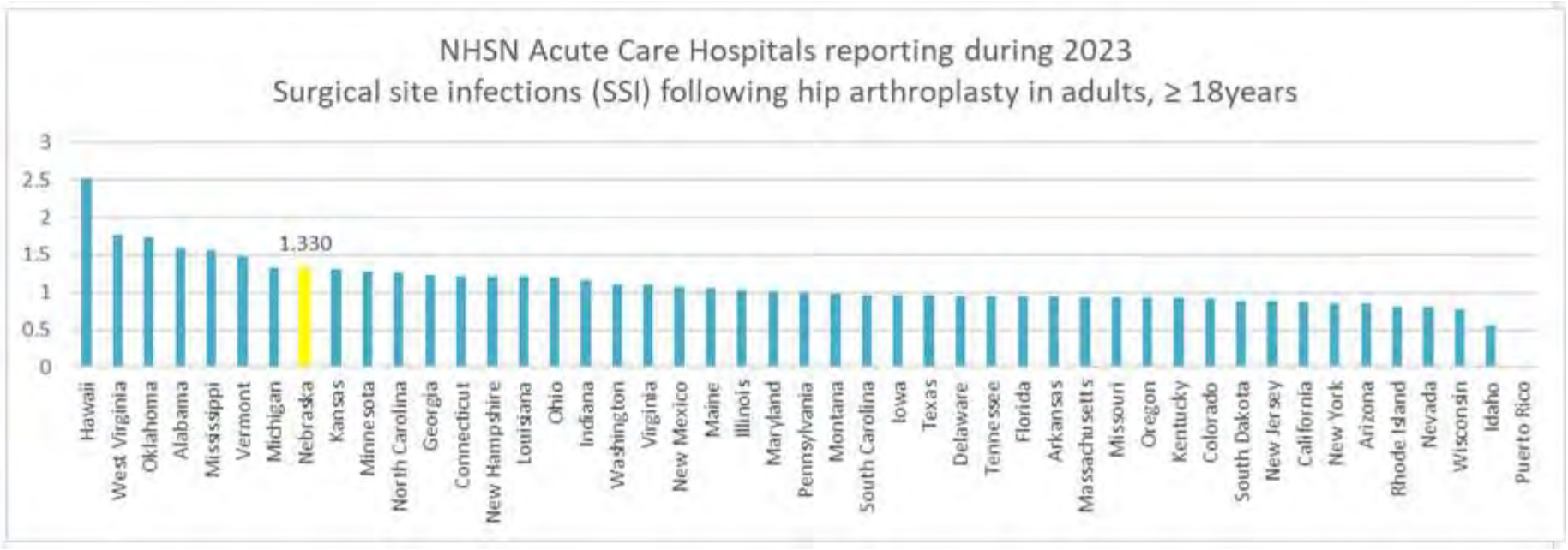
*2025 Data is for January 2025-April 2025

NEBRASKA
Good Life. Great Mission.

DIVISION OF PUBLIC HEALTH

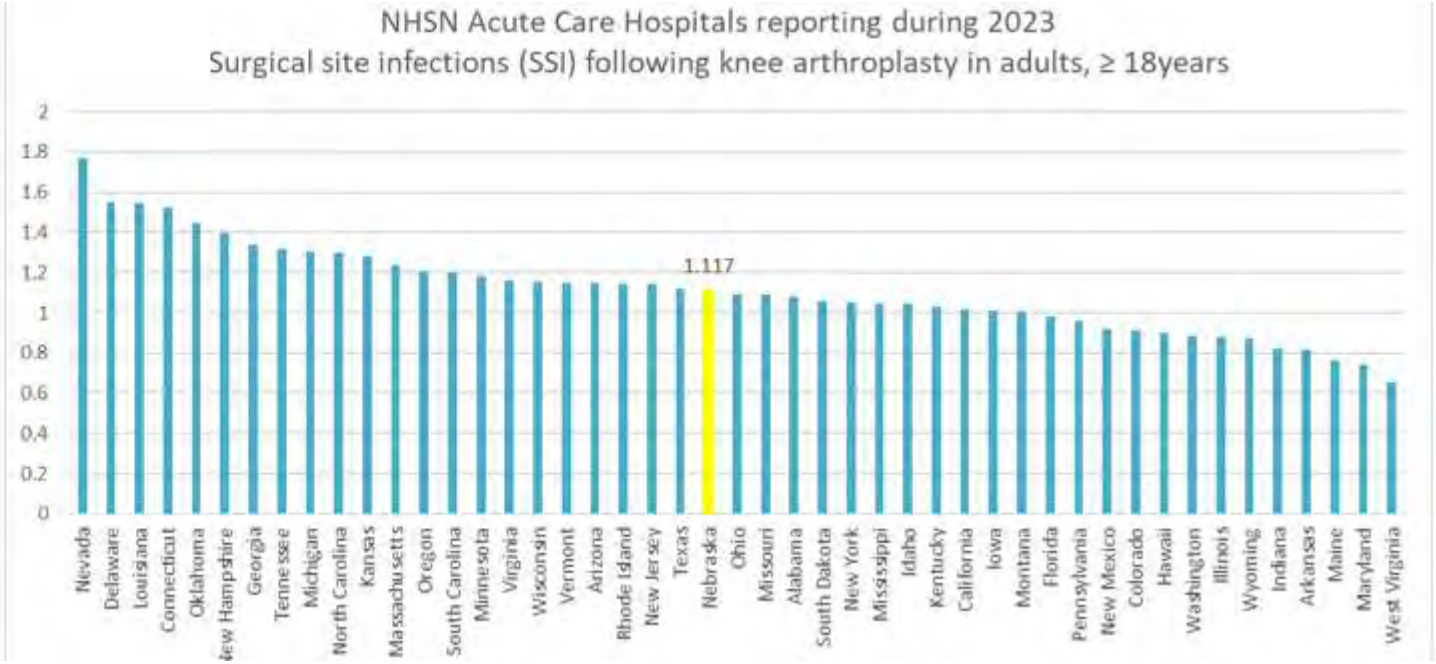
Hip Arthroplasty

Nebraska **ranked 40th** (n=47) for surgical site infections (SSI) following hip arthroplasty in 2023.



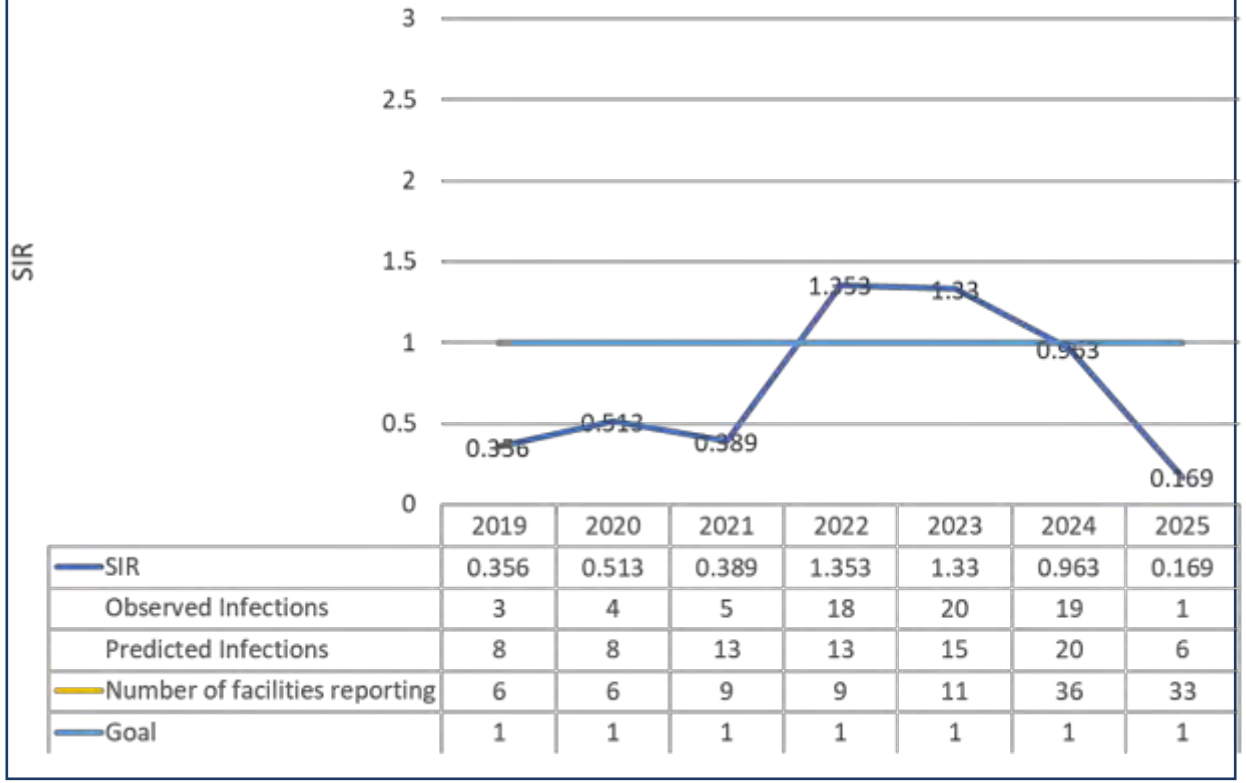
Knee Arthroplasty

Nebraska **ranked 25th** (n=47) for surgical site infections (SSI) following knee arthroplasty in 2023.



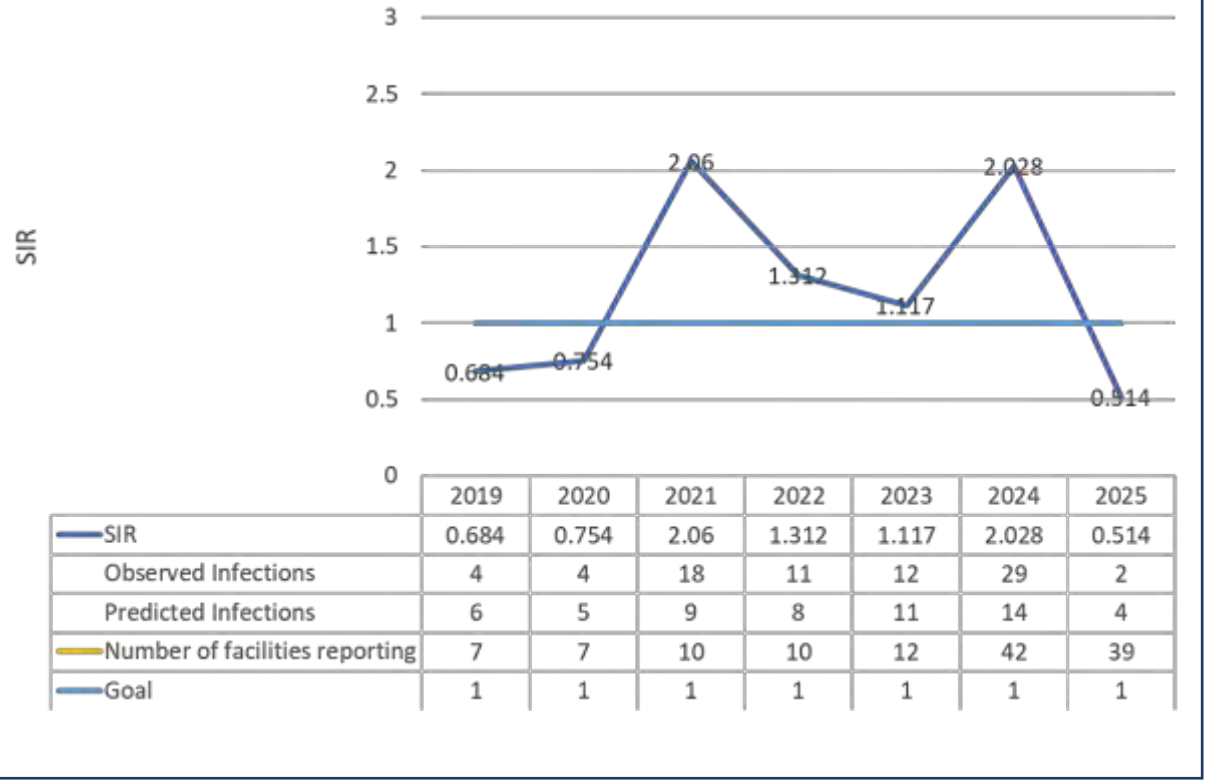
Healthcare-Associated Infections – Nebraska 2019-2025

SSI [Hip Arthroplasty]



	2019	2020	2021	2022	2023	2024	2025
SIR	0.356	0.513	0.389	1.353	1.33	0.963	0.169
Observed Infections	3	4	5	18	20	19	1
Predicted Infections	8	8	13	13	15	20	6
Number of facilities reporting	6	6	9	9	11	36	33
Goal	1	1	1	1	1	1	1

SSI [Knee Arthroplasty]



	2019	2020	2021	2022	2023	2024	2025
SIR	0.684	0.754	2.06	1.312	1.117	2.028	0.514
Observed Infections	4	4	18	11	12	29	2
Predicted Infections	6	5	9	8	11	14	4
Number of facilities reporting	7	7	10	10	12	42	39
Goal	1	1	1	1	1	1	1

2019-2023 Data Source: CDC NHSN HAI Progress Reports. (*includes ACH only).

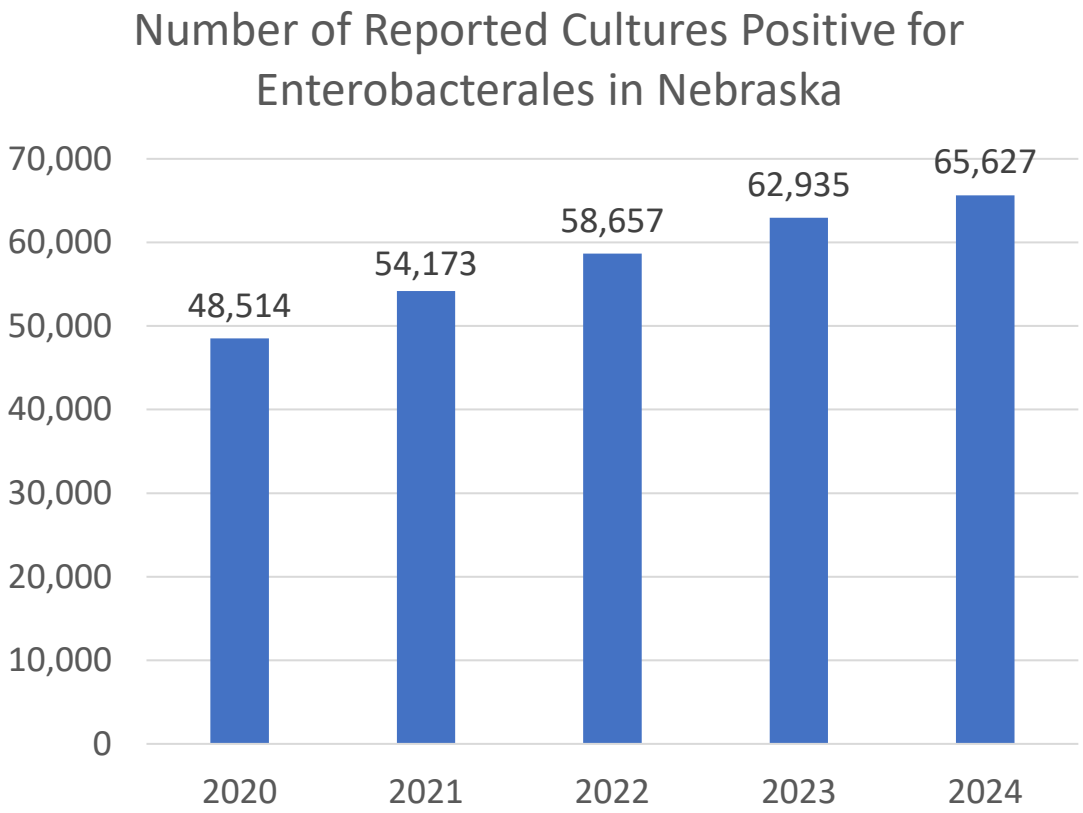
2024-2025 Data Source- NHSN DUA Group (*includes ACH and CAH)

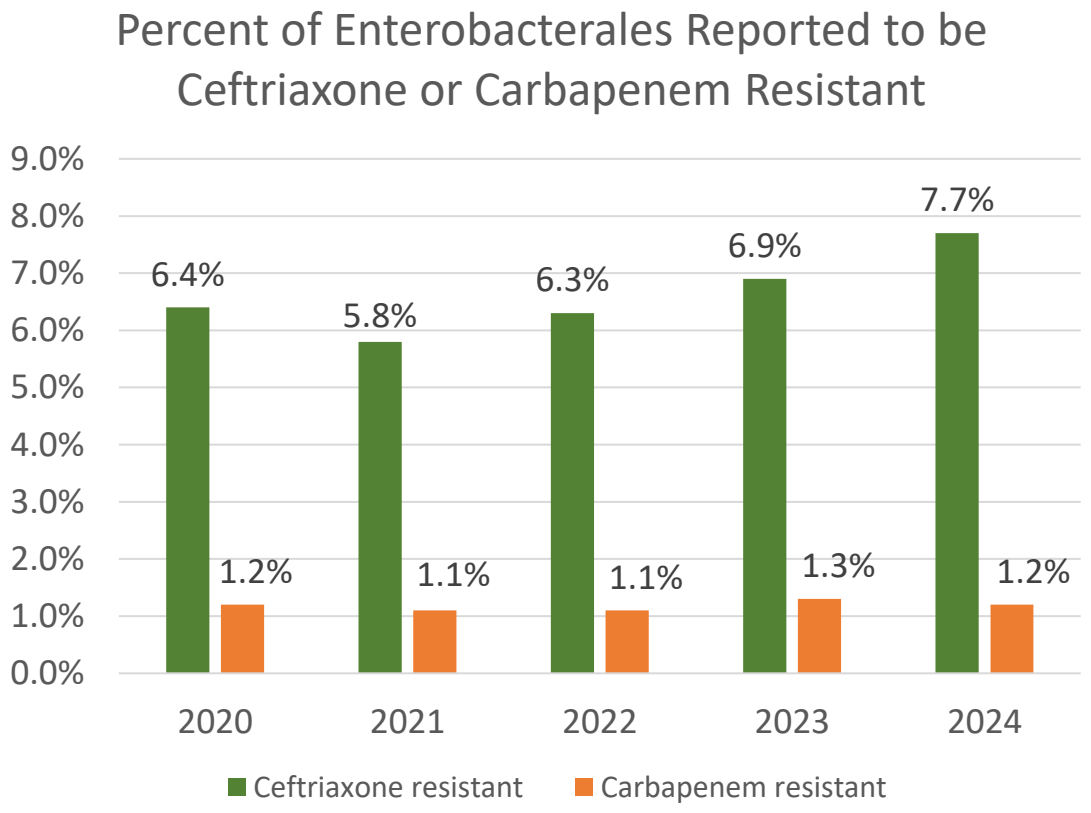
*2025 Data is for January 2025-April 2025

*KRPO and HRPO SSIs are not required to be reported by CMS

NEBRASKA Good Life. Great Mission. DIVISION OF PUBLIC HEALTH

Ceftriaxone and Carbapenem Resistance in Enterobacterales in Nebraska

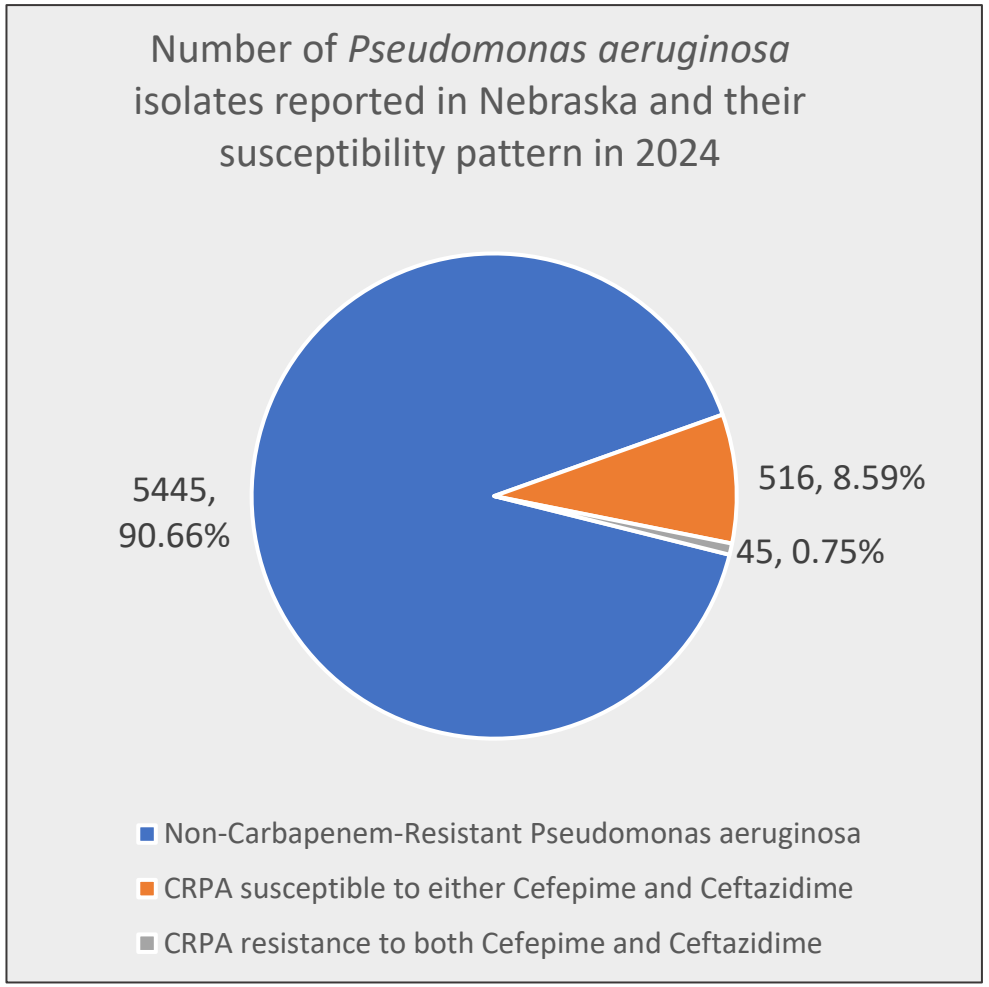




Data Source: Electronic Lab Reports Submitted to NEDSS
Notes: Preliminary data (subject to change after further updates)

NEBRASKA
Good Life. Great Mission.
DIVISION OF PUBLIC HEALTH

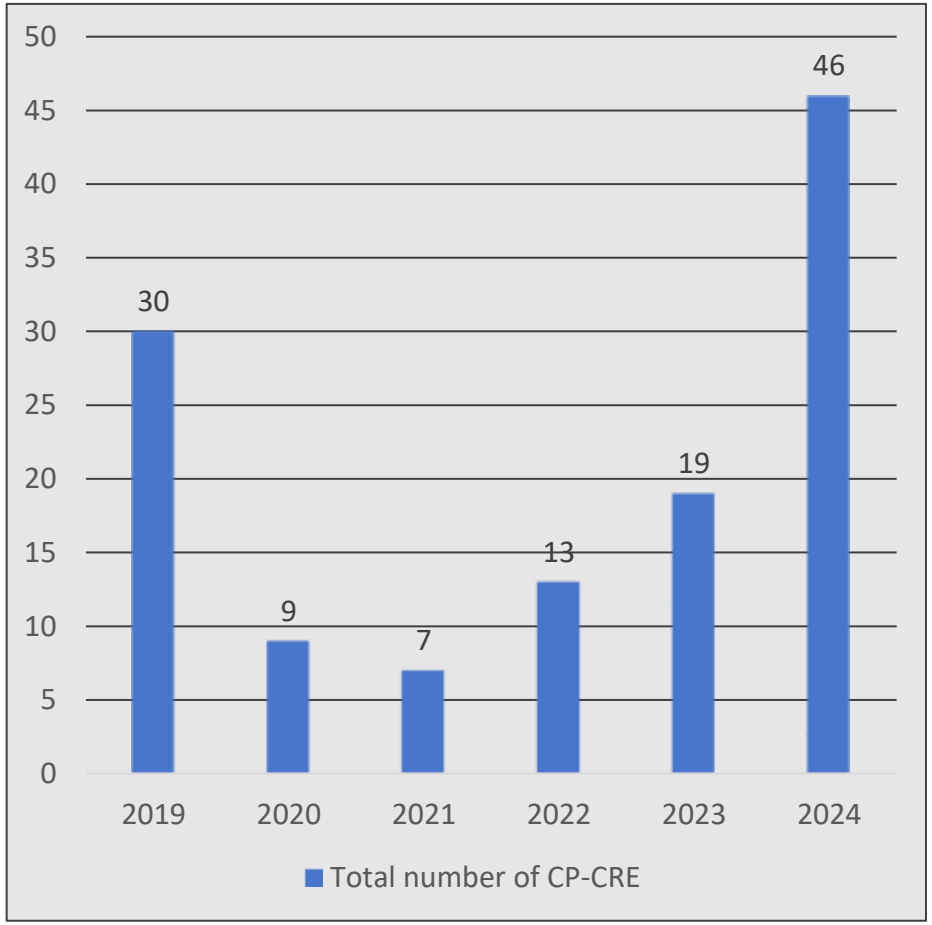
Carbapenem-Resistant Pseudomonas aeruginosa in Nebraska - 2024



Data Source: Electronic Lab Reports Submitted to NEDSS
Note: Preliminary data (subject to change after further updates)

Carbapenemase Genes Identified in Enterobacterales Isolates, Nebraska: 2019-2024

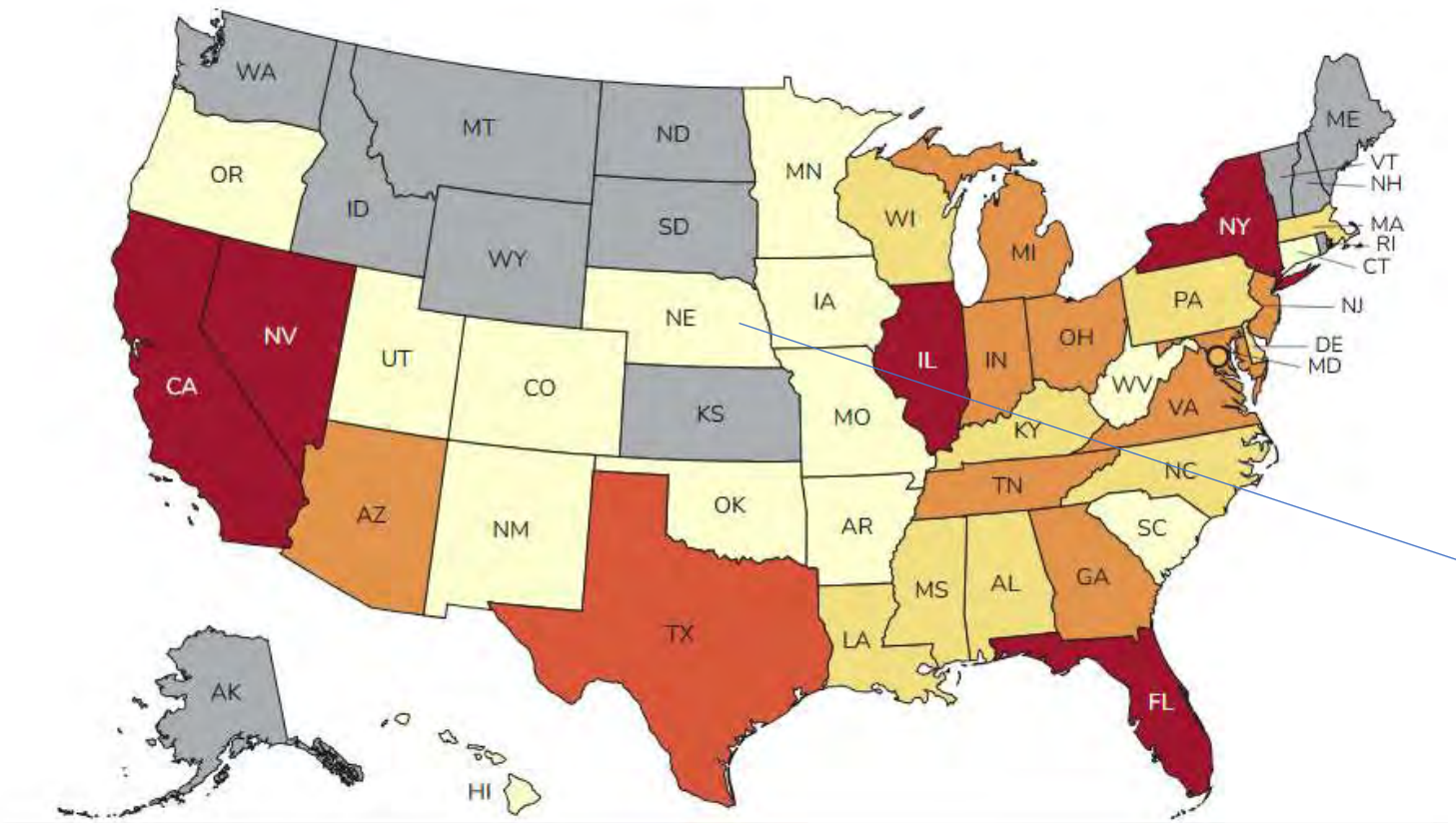
Year	KPC	NDM	OXA-48	OXA-181	VIM	IMP
2019	18	9	0	3	0	0
2020	8	0	1	0	0	0
2021	6	0	1	0	0	0
2022	8	3	1	0	1	0
2023	7	6	4	2	0	0
2024	26	14	5	0	0	1
2025 to date	8	2	0	1	0	0



Notes:

- KPC in 2024 included twelve KPC-2, two KPC-3, four KPC-4, and one KPC-6
  - KPC variants not identified for the rest
- CP-CRPA and CP-CRAB are rarely identified
  - In 2024- 1 CP CRPA (NDM) has been reported in addition to 4 CP-CRAB (1 NDM and 3 OXA-24)

Clinical C. auris Cases in the US by State : 2016 - 2023



Legend

From 2016-2023, there have been 10,788 clinical cases. There were an additional 22,931 screening cases not shown on the map. There were 9 clinical cases from 2013-2015 that were reported retrospectively.

- No new clinical cases
- 1 to 10
- 11 to 50
- 51 to 100
- 101 to 500
- 501 to 1000
- >1000

Nebraska only had one clinical case identified in 2020 up until late 2023. C. auris transmission was never identified in the state.

https://www.cdc.gov/candida-auris/tracking-c-auris/index.html

Transmission of *Candida auris* in Nebraska

Nebraska Department of Health and Human Services

Health Alert Network

ALERT

March 26, 2024

Candida auris in Nebraska

Candida auris is an emerging antimicrobial-resistant yeast that was first identified in 2009 in Asia and began spreading in the United States in 2015. It can cause severe infections and spreads easily between hospitalized patients and nursing home residents. *C. auris* is often multidrug-resistant and some strains are resistant to all three major classes of antifungal medications. In 2019, CDC declared *C. auris* as one of the urgent (highest level) antibiotic resistance threats in the United States. It is still rare in the US, but cases have been increasing nationwide with 8,131 *C. auris* cases (clinical and screening cases) detected in the US in 2022 as compared to 323 in 2018. Nebraska is considered a low incidence state and transmission of *C. auris* was not detected before this year. However, to-date, 5 cases (clinical and screening cases) of *C. auris* have been identified in Nebraska in 2024. Therefore, it is important for all healthcare personnel in Nebraska to be aware of transmission dynamics, risk factors, diagnostic challenges, and treatment recommendations for *C. auris*.

https://dhhs.ne.gov/han%20Documents/ALERT03262024.pdf

2024 Nebraska DHHS *C. auris* Response

Day 1

NDDHS notified of a positive *C. auris* culture result in late 2023 and a MDRO containment response was launched in Facility A

Day 3 to 64

Exposure lists were put together and 32 patients underwent colonization screening with negative test results

Day 100

NDHHS notified of another positive *C. auris* culture result at same facility triggering a potential outbreak containment response

Day 103

Case/Exposure definitions established. 109 exposures identified. Colonization screening requested for those who are in Healthcare Facility A

Day 105-106

First 2 cases matched by WGS. 2 additional cases identified at Facility A. Tracking started for exposed patients currently at other facilities in addition to Facility A

Day 107 - 112

Systems were put in place to notify other facilities for exposure and offer colonization screening for exposed individuals within their facilities

Day 113

1 more case at Facility A and another case at Facility B was identified. Updated exposure lists requested. An ICAR was conducted at Facility A

Day 140 to 9 months

Additional rounds of screenings continued. Case investigations were completed. Outbreak control measures put in place. 148 of 366 exposed screened with no more positives. Additional point prevalence screenings at both Facility A and B also did not identify any more cases. All identified cases matched on WGS

Case and Exposure Definitions

Clinical Case Definition

- A positive culture result from a clinical specimen obtained from an individual receiving care at a Nebraska healthcare facility from day 1 to Month 9

Screening Case Definition

- A positive culture results from a specimen obtained by swabbing the axilla and groin of an individual who has received care at a Nebraska healthcare facility from day 1 to Month 9

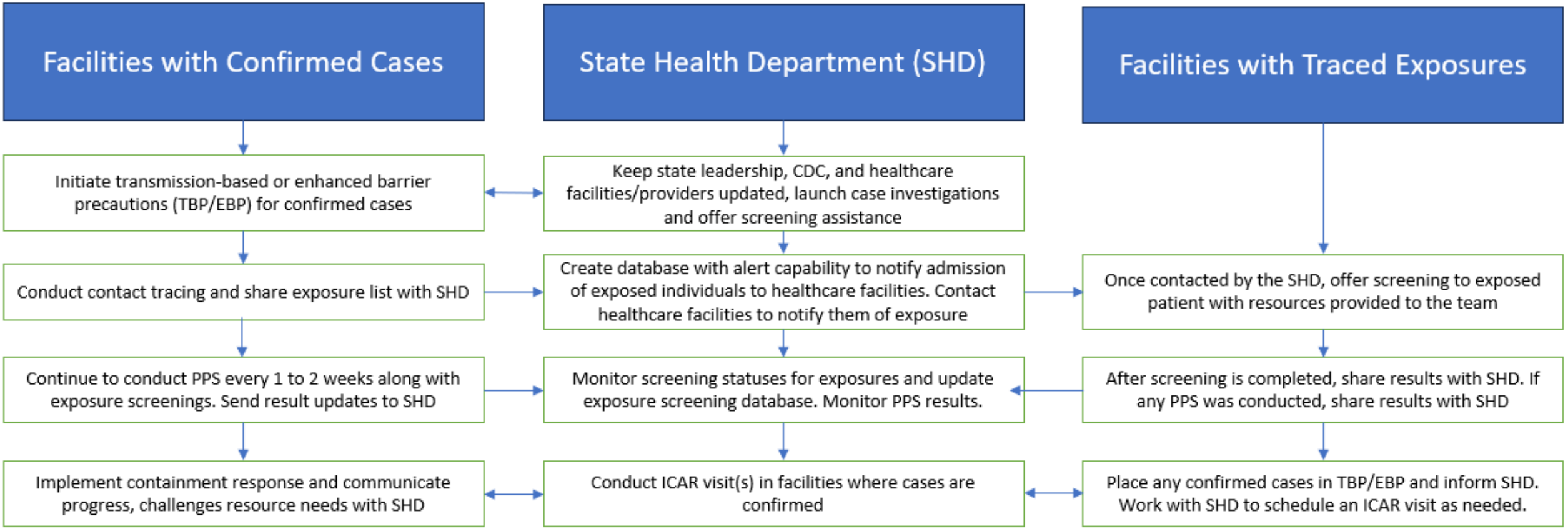
Exposure Definition

- Patients who were in the same unit of the hospital or residents in the same building of the long-term care facility for more than 24 hour with at least one confirmed *C. auris* case; or occupied the same room immediately after confirmed case was transferred out of the room between day 1 and Month 9 were considered exposed.

Whole Genome Sequencing Results for 2024 *C. auris* Cluster

	Ref 1	NE-1	NE-2	NE-3	NE – 4	NE-5	NE - 6
Ref 1	0	4483	4485	4483	4483	4484	4484
NE - 1	4483	0	9	12	10	12	7
NE- 2	4485	9	0	10	7	13	4
NE- 3	4483	12	10	0	5	15	5
NE- 4	4483	10	7	5	0	12	4
NE-5	4484	12	13	15	12	0	10
NE-6	4484	7	4	5	4	10	0

Collaborating Containment Response with Healthcare Facilities



Colonization Screening for *C. auris* Containment Response

Facilities	Number of Nebraska facilities participated in screening	Number of patients undergoing first screening out of 423 exposed patients	Number of patients undergoing second screening out of 423 exposed patients
Acute care facilities	14	123	76
Long-Term Care Facilities	20	72	63
Out of state		9	0
Total	34	204	139

Notes:

- These tests do not include additional Point Prevalence Screenings (490 tests on 411 individuals) that were performed at weekly intervals (until ongoing transmission was ruled out) on the units suspected to have transmissions.
- Repeat point prevalence screening at longer intervals were also performed at facilities where cases were identified, and those results are also not included in the numbers above

In 2025 So Far …..

- Another cluster was detected in 2025 after a patient who was exposed to *C. auris* outside of Nebraska received healthcare in one of our facilities.
  - **9 cases** (including both clinical and screening) have been identified
  - **Over 800 colonization screening tests** have been done over the past few months to look for additional cases
  - Coordinated with **15 acute-care hospitals** and **57 long-term care facilities** during this response so far
  - Further transmission appears to have stopped although the containment response is still ongoing so cannot say that conclusively at this point

Candida auris Clades

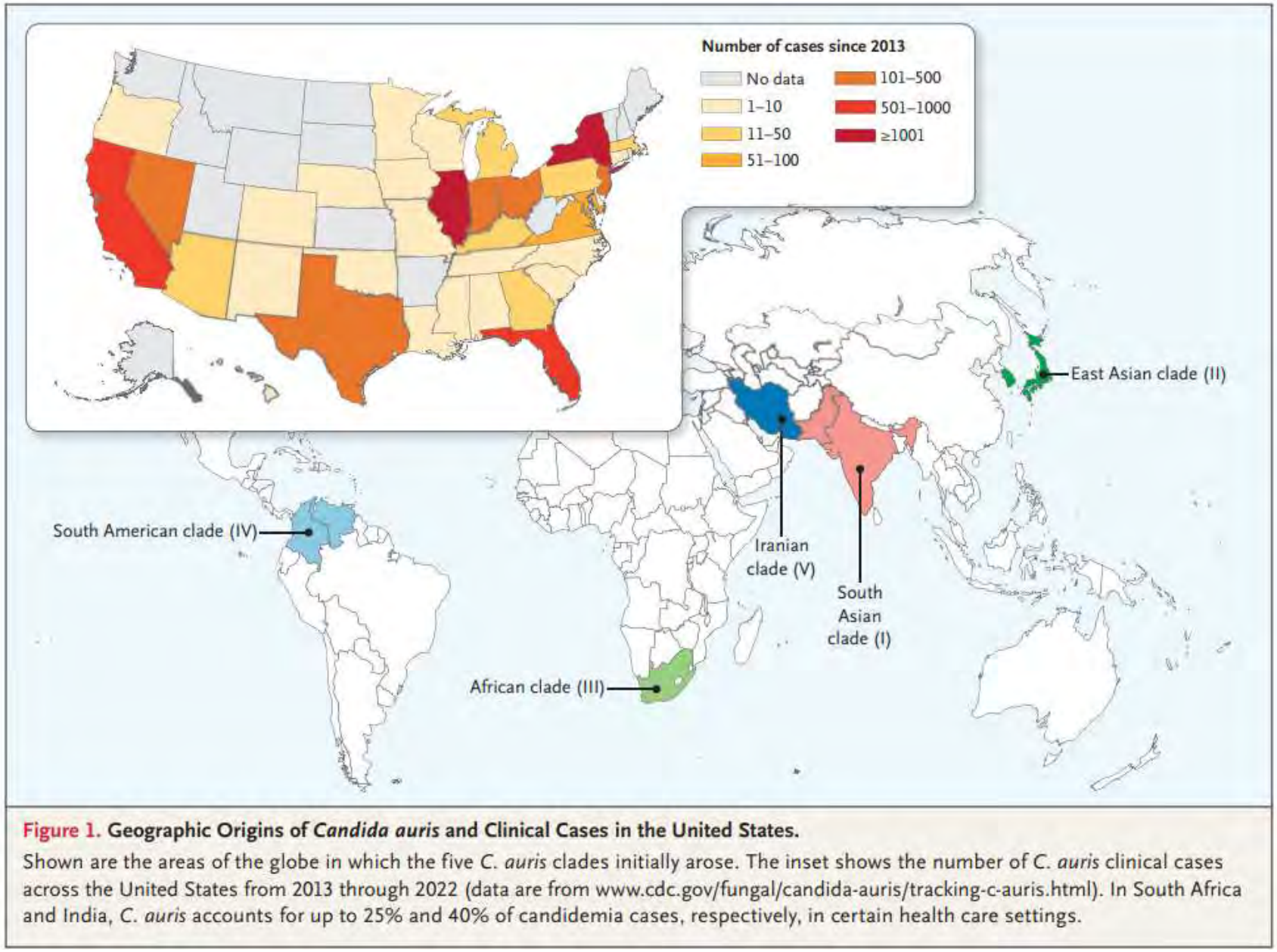


Figure 1. Geographic Origins of *Candida auris* and Clinical Cases in the United States.
Shown are the areas of the globe in which the five *C. auris* clades initially arose. The inset shows the number of *C. auris* clinical cases across the United States from 2013 through 2022 (data are from www.cdc.gov/fungal/candida-auris/tracking-c-auris.html). In South Africa and India, *C. auris* accounts for up to 25% and 40% of candidemia cases, respectively, in certain health care settings.

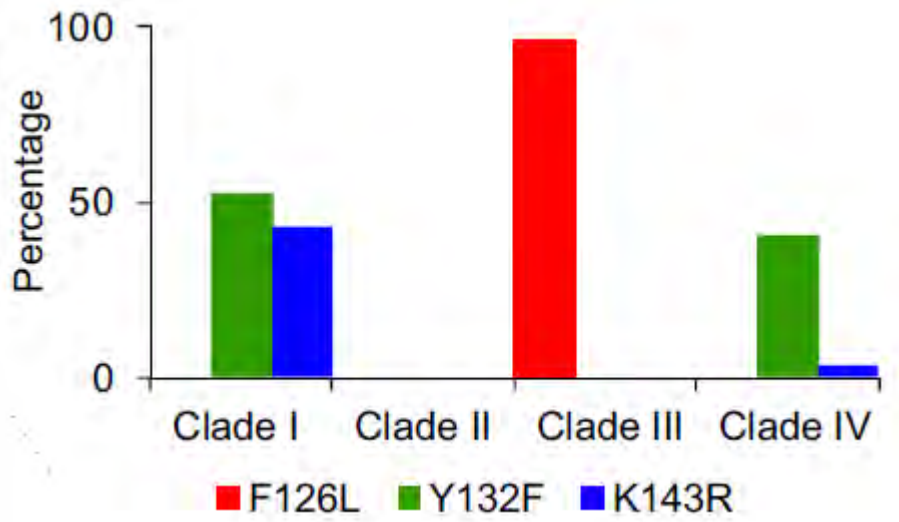
In Nebraska we have identified Clade I and Clade III cases

Lionakis MS et al. N Engl J Med. 2024 Nov 21;391(20):1924-1935

Antifungal Resistance in *C. auris* Clades

TABLE 1 Frequency of antifungal drug resistance among *Candida auris* isolates by clade

	Frequency (%) of antifungal drug resistance in isolates (*n*)					
Clade (*n*)	Susceptible	Fluconazole resistant	Amphotericin B resistant	Micafungin resistant	MDR[a]	XDR[b]
Clade I (118[c])	3 (4)	97 (114)	47 (54)	6 (7)	45 (53)	3 (4)
Clade II (7)	86 (6)	14 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Clade III (51)	2 (1)	98 (50)	0 (0)	8 (4)	8 (4)	0 (0)
Clade IV (120)	31 (37)	59 (71)	11 (13)	9 (11)	10 (12)	0 (0)
Total (296)	16 (48)	80 (236)	23 (67)	7 (22)	23 (69)	1 (4)



Chow et al. *mBio*. 2020;11(2):e03364-19

Possibility of *C. auris* Misidentification

Identification Method	Database/Software, if applicable	*C. auris* is confirmed if initial identification is *C. auris*.	*C. auris* is possible if the following initial identifications are given. Further work-up is needed to determine if the isolate is *C. auris*.
Bruker Biotyper MALDI-TOF	RUO libraries (Versions 2014 [5627] and more recent)	*C. auris*	n/a
	CA System library (Version Claim 4)	*C. auris*	n/a
bioMérieux VITEK MS MALDI-TOF	RUO library (with Saramis Version 4.14 database and Saccharomycetaceae update)	*C. auris*	n/a
	IVD library (v3.2)	*C. auris*	n/a
	Older IVD libraries	n/a	*C. haemulonii* *C. lusitaniae* No identification
VITEK 2 YST	Software version 8.01*	*C. auris*	*C. haemulonii* *C. duobushaemulonii* *Candida* spp. not identified
	Older versions	n/a	*C. haemulonii* *C. duobushaemulonii* *Candida* spp. not identified
API 20C		n/a	*Rhodotorula glutinis* (without characteristic red color) *C. sake* *Candida* spp. not identified
API ID 32C		n/a	*C. intermedia* *C. sake* *Saccharomyces kluyveri*
BD Phoenix		n/a	*C. catenulata* *C. haemulonii* *Candida* spp. not identified
MicroScan		n/a	*C. lusitaniae*** *C. guilliermondii*** *C. parapsilosis*** *C. famata* *Candida* spp. not identified
RapID Yeast Plus		n/a	*C. parapsilosis*** *Candida* spp. not identified
GenMark ePlex BCID-FP Panel		*C. auris*	n/a

* There have been reports of *C. auris* being misidentified as *C. lusitaniae* and *C. famata* on VITEK 2. A confirmatory test such as cornmeal agar may be warranted for these species.

** *C. guilliermondii*, *C. lusitaniae*, and *C. parapsilosis* generally make hyphae or pseudohyphae on cornmeal agar. If hyphae or pseudohyphae are not present on cornmeal agar, the isolate should raise suspicions of being *C. auris* as *C. auris* typically does not make hyphae or pseudohyphae. However, some *C. auris* isolates have formed hyphae or pseudohyphae. Therefore, it would be prudent to consider any *C. guilliermondii*, *C. lusitaniae*, and *C. parapsilosis* isolates identified on MicroScan and any *C. parapsilosis* isolates identified on RapID Yeast Plus as possible *C. auris* isolates and further work-up should be considered.

Specimens should be sent to NPHL for further testing if misidentification of *Candida species* is suspected

Specimen should also be sent to NPHL if laboratory does not have the ability to perform species identification on Candida isolates growing from a sterile body site.

https://www.cdc.gov/candida-auris/media/pdfs/Testing-algorithm_by-Method_508_1.pdf

Key Observations and Lessons Learned from CPO and *C. auris* Responses


Hand Hygiene and PPE compliance remains a challenge


Gaps still exist in Environmental Services staff education and training


Environmental contamination/reservoirs in facilities are playing a role in transmission

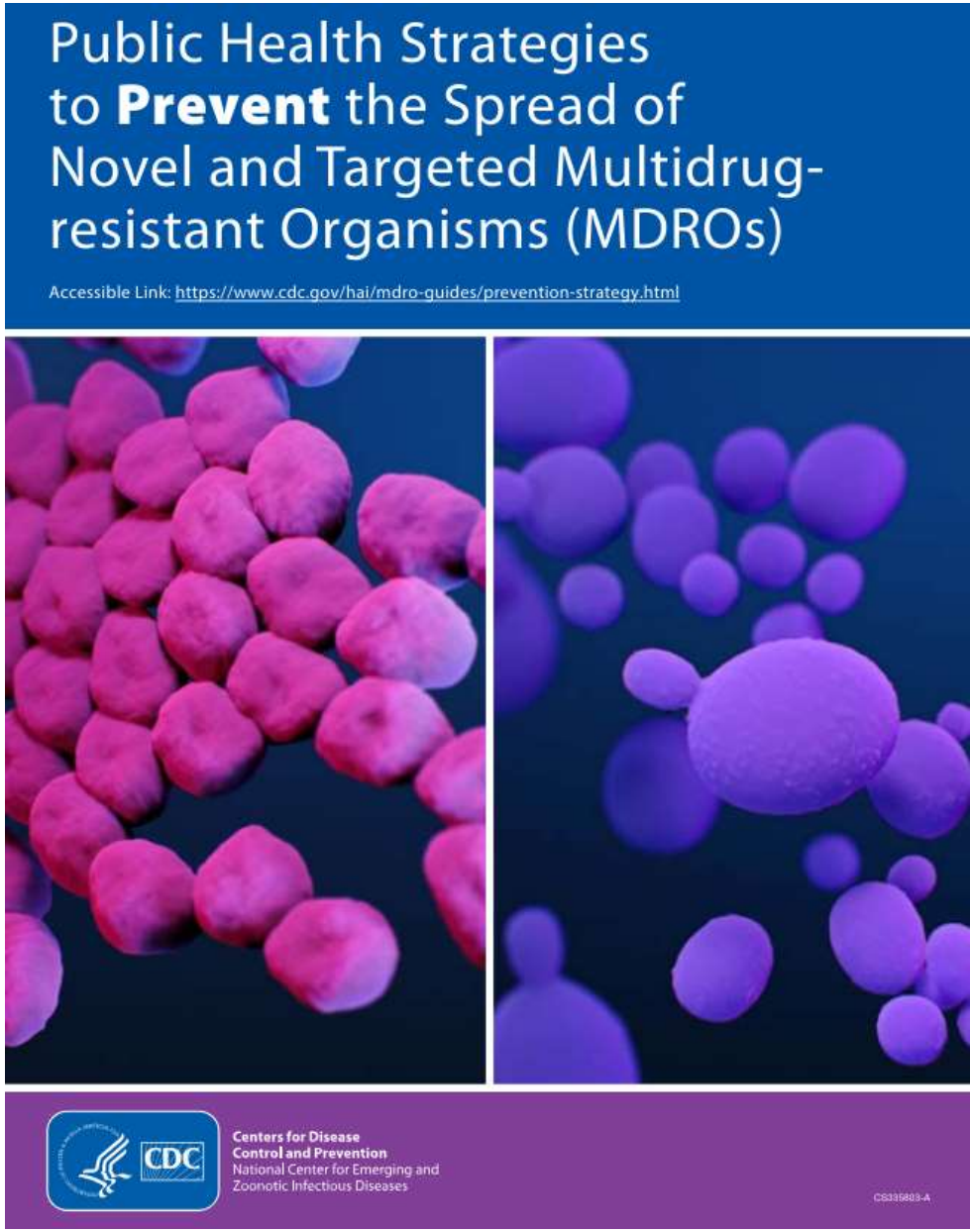

Receiving healthcare outside the state is a significant risk factor


Whole Genome Sequencing has been helpful in identification and containment of MDRO clusters


In general, transmission is not being seen when facilities are aware of colonization status of patients/residents

MDRO Prevention Plan

CDC has published guidance for state, local, territorial, and tribal health departments to support the development, implementation, and coordination of activities focusing on preventing spread of novel and targeted MDROs



https://www.cdc.gov/healthcare-associated-infections/php/preventing-mdros/mdro-prevention-strategies.html

CDC- Recommended MDRO Prevention Strategies

Strategy 1	Strategy 2	Strategy 3	Strategy 4:
• Conduct education	• Improve infection prevention and control (IPC) practices	• Detect colonized individuals	• Facilitate communication

HAI/AR Team Planned Outreach to Nebraska Healthcare Facilities

MDRO admission screening for high-risk patients

Point prevalence screening for higher-risk units or facilities

Onsite ICARs for "influential" and "highly connected" facilities

Educational programs focused on MDRO prevention efforts

Outreach to alert facilities on admissions for patients with history of infection or colonization secondary to targeted MDROs

Whole Genome Sequencing for identifying and/or investigating MDRO clusters

Comparison of Daily Screening with Admission and Discharge Screening

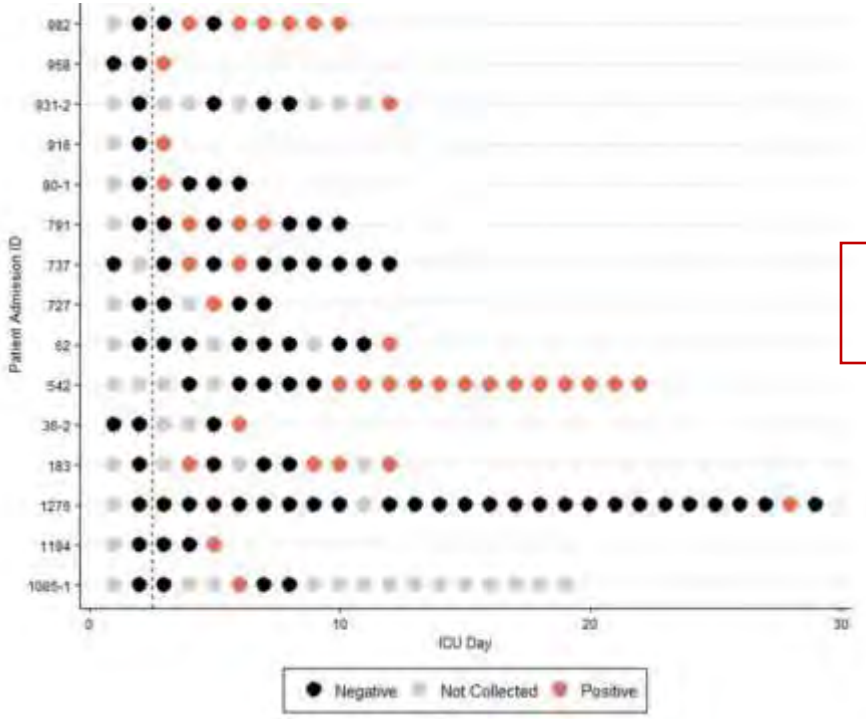


Table 2. Detection of Multidrug-Resistant Organism Colonization Among 939 Patient Admissions

Multidrug-Resistant Organism Type[a]	Detected by any Method, n (%)	Detected by Daily Surveillance Cultures, n (%)	Detected by Admission + Discharge Surveillance Cultures, n (%)	Percent Detection, Admission + Discharge vs Daily Surveillance Cultures, % (95% CI)	P^b	Detected by Clinical Cultures, n (%)	Ratio of Detection by Daily Surveillance Cultures vs Clinical Cultures
Vancomycin-resistant *Enterococcus*	218 (23.2)	218 (23.2)	188 (20.0)	86 (81–91)	<.001	9 (4.1)	24:1
Carbapenem-resistant Enterobacterales	49 (5.2)	49 (5.2)	42 (4.5)	86 (76–96)	.023	5 (10.2)[d]	10:1
Carbapenemase-producing Enterobacterales[c]	33 (3.5)	33 (3.5)	30 (3.2)	91 (82–100)	.248	5 (15.2)[d]	7:1
Third-generation cephalosporin-resistant Enterobacterales	270 (28.8)	265 (28.2)	237 (25.2)	89 (85–93)	<.001	24 (8.9)	11:1
Extended-spectrum β-lactamase-producing Enterobacterales	139 (14.8)	136 (14.5)	121 (12.9)	90 (85–95)	<.001	16 (11.5)	9:1

Figure 2. Daily surveillance culture detection patterns of CRE among patients who acquired CRE. Each patient's ICU stay is illustrated by a single row, with each circle representing a calendar day. The day of ICU admission is represented by the first circle in each row. Orange circles indicate culture detection of CRE. Black circles indicate negative culture for CRE. Gray circles indicate that a sample was not collected on that day. The dashed vertical line marks the boundary between the initial 2-day admission window period used to define timing of acquisition and the rest of the ICU stay. Abbreviations: CRE, carbapenem-resistant Enterobacterales; ICU, intensive care unit.

Sansom SE et al. J Infect Dis. 2024 Oct 16;230(4):807-815

NEBRASKA
Good Life. Great Mission.
DIVISION OF PUBLIC HEALTH

Admission and PPS Screening to Reduce Transmission of Carbapenem-Resistant Gram-Negative Bacteria

Table 2 Acquisition rates of CRPA, CRAB, and CRE in clinical specimens between the intervention and control periods

	Intervention period, per 1000 person-days (95% CI)	Control period, per 1000 person-days (95% CI)	Incidence rate ratio (95% CI)	*P* value
Modified intention-to-treat analysis[a]				
Total	1.75 (0.87–3.13)	3.33 (2.16–4.92)	0.53 (0.23–1.11)	0.07
CRPA	0.32 (0.04–1.15)	1.07 (0.46–2.10)	0.30 (0.03–1.50)	0.10
CRAB	0.80 (0.26–1.86)	1.73 (0.92–2.96)	0.46 (0.13–1.37)	0.13
CRE	0.80 (0.26–1.86)	0.93 (0.38–1.92)	0.85 (0.21–3.12)	0.79

CRPA carbapenem-resistant *P. aeruginosa*; *CRAB* carbapenem-resistant *A. baumannii*; *CRE* carbapenem-resistant Enterobacterales; *CI* confidence interval

[a] Excluding SICU2 in both periods 1 and 2

Pragmatic, cluster-randomized, non-blinded cross over study in 6 adult ICU in a tertiary care center in Seoul, South Korea:

Interventions included:

- Admission testing within 2 days of admission
- Weekly surveillance testing
- Preemptive contact precaution on admission (although in the second half of second period of study universal PPE use was implemented due to COVID-19 for all ICU patients)

Table 4 Lengths of hospital and ICU stays and cost of hospitalizations in the intervention and control periods (mITT population)

	Intervention period (n = 590)	Control period (n = 724)	*P* value
Length of hospital stay, mean (± SE) days	44.7 (1.9)	45.6 (1.9)	0.73
Length of ICU stay, mean (± SE) days	11.0 (0.5)	11.2 (0.5)	0.73
Cost of hospitalization ($), mean (± SE)	93,491 (6034)	87,825 (4,252)	0.43

Table 3 Clinical manifestations and outcomes between the intervention and control periods

	Intervention period (n = 590)	Control period (n = 724)	*P* value
Clinical diagnosis of infectious diseases			
Hospital-acquired bloodstream infection	0	1 (0.1)	0.37
CRPA	0	0	–
CRAB	0	1 (0.1)	0.37
CRE	0	0	–
Catheter-related bloodstream infection	0	1 (0.1)	0.37
CRPA	0	0	–
CRAB	0	1 (0.1)	0.37
CRE	0	0	–
Urinary tract infection	0	1 (0.1)	0.37
CRPA	0	0	–
CRAB	0	0	–
CRE	0	1 (0.1)	0.37
Catheter-associated urinary tract infection	0	1 (0.1)	0.37
CRPA	0	0	–
CRAB	0	0	–
CRE	0	1 (0.1)	0.37
Pneumonia	0	4 (0.6)	0.07
CRPA	0	2 (0.3)	0.20
CRAB	0	2 (0.3)	0.20
CRE	0	1 (0.1)	0.37
Ventilator-associated pneumonia	0	3 (0.4)	0.12
CRPA	0	2 (0.3)	0.20
CRAB	0	1 (0.1)	0.37
CRE	0	1 (0.1)	0.37
Death			
In-ICU mortality[a]	70 (11.9)	76 (10.5)	0.41

Jung J. et al. Antimicrob Resist Infect Control 12, 16 (2023).

Admission and PPS Screening Impact on CRAB in an Endemic Hospital Setting

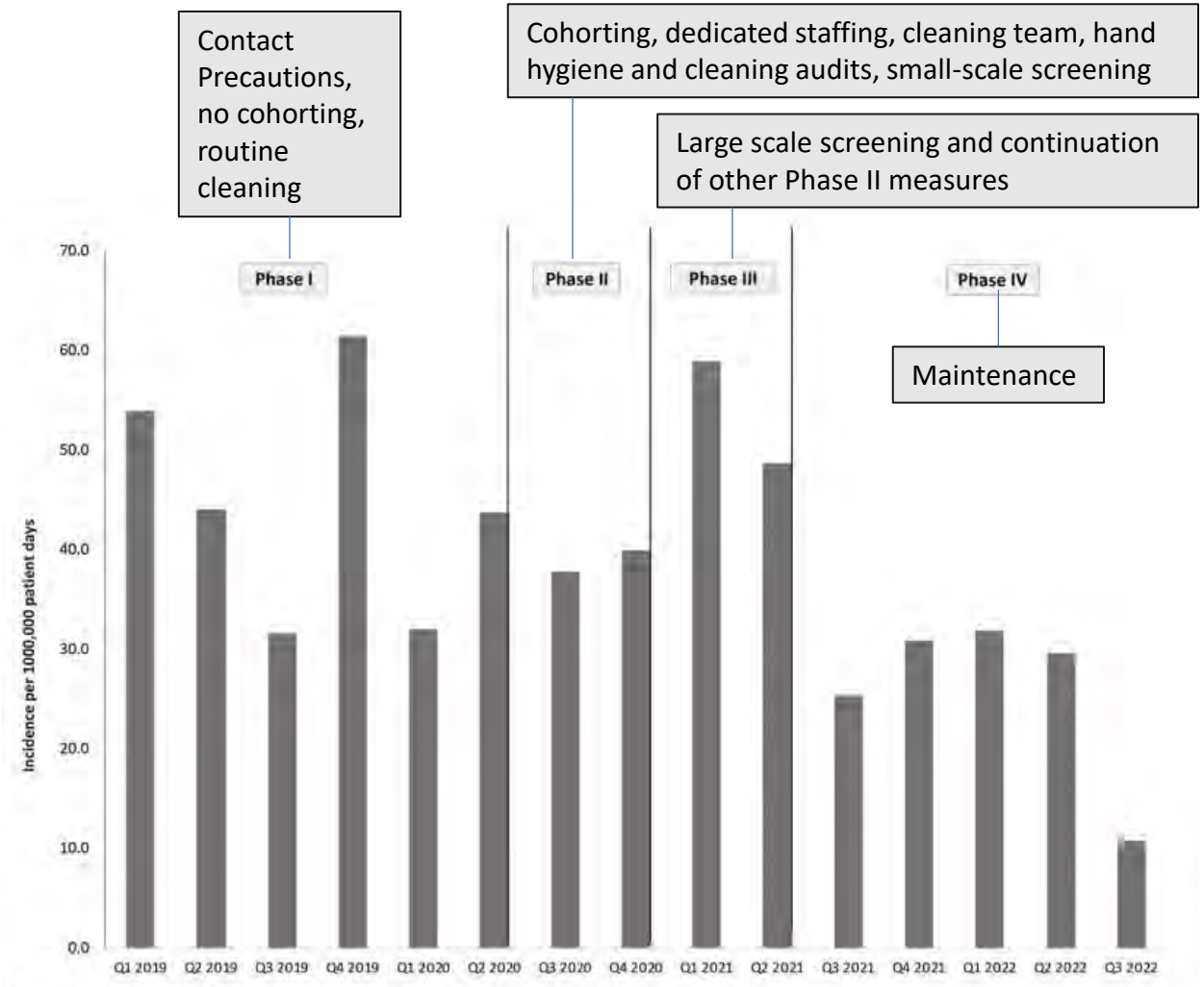


Figure 2. Incidence density of clinical hospital-acquired carbapenem-resistant *Acinetobacter baumannii* between 2019 and 2022.
Note. Phase I (January 2019–May 2020), baseline measures; phase II (June–December 2020), cohorting CRAB carriers, dedicated staff, enhanced environmental cleaning, small-scale screening; phase III (January–June 2021), cohorting CRAB carriers, dedicated staff, enhanced environmental cleaning, large-scale screening; phase IV (July 2021–September 2022), follow-up.

Phase 3 Screening:
Patients transferred from long-term care facilities or with prior hospitalization within the previous 6 months were screened on admission.
All patients admitted to the 6 step-up units and adult ICUs were screened on admission and weekly

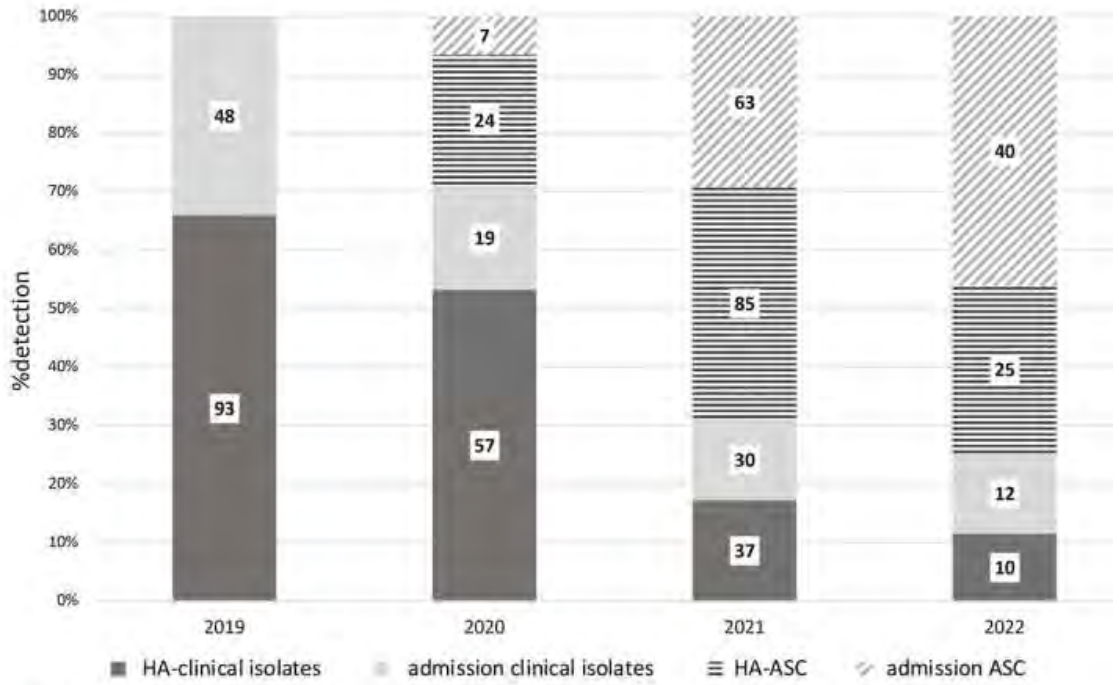


Figure 5. Mode of initial detection of carbapenem-resistant *Acinetobacter baumanni*, 2019–2022.
Note. CRAB, carbapenem-resistant *Acinetobacter baumannii*; HA, hospital acquired.
The numbers within the column indicate the total count of cases.

Ben-David D, et al. Infection Control & Hospital Epidemiology. 2024;45(2):188-195

NEBRASKA
Good Life. Great Mission.
DIVISION OF PUBLIC HEALTH

Clinical Infectious Diseases

INVITED ARTICLE

HEALTHCARE EPIDEMIOLOGY: Robert A. Weinstein, Section Editor

Control of Carbapenem-resistant Enterobacteriaceae, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa* in Healthcare Facilities: A Systematic Review and Reanalysis of Quasi-experimental Studies

Used effective practice and organization of care (EPOC) quality criteria: No RCTs identified; all at high risk of bias

Table 3. Most Frequent Components in Infection Prevention and Control Multimodal Interventions Implemented in Effective Practice and Organization of Care Studies

Intervention	Studies *WITH* Intervention (%)[a]	Studies *WITH* Intervention AND Reporting Significant Reduction in Slope and/or Level (%)[b]	Studies *WITHOUT* Intervention AND Reporting Significant Reduction in Slope and/or Level (%)[c]
All studies (N = 17)			
Contact precautions (ie, at least use of disposable gowns and gloves) education/ monitoring	15/17 (0.9)	14/15 (0.9)[d]	2/2 (1)
Active surveillance cultures[e]	14/17 (0.8)	12/14 (0.9)[d]	3/3 (1)
Monitoring/audit of infection prevention and control practices and feedback	14/17 (0.8)	13/14 (0.9)[d]	3/3 (1)
Patient isolation or cohorting[f]	12/17 (0.7)	12/12 (1)[d]	4/5 (0.8)
Hand hygiene education/monitoring	9/17 (0.5)	8/9 (0.9)[d]	8/8 (1)
Environmental cleaning[g]	7/17 (0.4)	7/7 (1)[d]	9/10 (0.9)
Antibiotic stewardship (eg, carbapenem restriction)	6/17 (0.4)	6/6 (1)[d]	10/11 (0.9)

Slide Courtesy of Dr. Graham Snyder

Tomcyzk S, Clin Infect Dis 2018

Among studies investigating active surveillance, a preponderance showed a significant change in either the slope of the outcome and/or an immediate change with the intervention.

Study (first author)	Slope change	(95% CI)	Level change	(95% CI)
CRE colonization (prevalence)				
DalBen	0.63	-0.01, 1.26	**-17.89**	-20.12, -15.65
CRE colonization or infection/10,000 patient-days				
Enfield	9.11	-2.80, 21.02	-10.69	-108.14, 86.77
CRE infection/10,000 patient-days				
Ben-David	**-0.57**	-0.58, -0.55	**-2.56**	-2.77, -2.33
Borer	**-0.32**	-0.58, -0.06	**-3.93**	-5.95, -1.91
Campbell	-0.09	-1.04, 0.87	**7.23**	1.89, 12.57
Ciobotaro	**-0.91**	-0.97, -0.85		
Gagliotti	**-0.01**	-0.02, -0.002	0.17	-0.18, 0.51
Hayden (facility 1)	-0.13	-2.70, 2.43	-17.43	-42.29, 7.43
Hayden (facility 2)	**-2.39**	-3.13, -1.66	-5.71	-13.99, 2.60
Hayden (facility 3)	0.55	-1.89, 2.99	**-25.33**	-38.27, -12.40
Hayden (facility 4)	-0.38	-2.33, 1.57	**-20.94**	-37.60, -4.28
CRAB and CRPA colonization/10,000 patient-days				
DalBen	-37.17	-102.13, 27.80	458.4	-236.26, 1153.05
CRAB colonization or infection/10,000 patient-days				
Enfield	**-4.81**	-7.00, -2.61	**-48.86**	-67.18, -30.54
Cho	**-0.01**	-0.02, -0.003	**0.34**	0.14, 0.54
CRPA infection/10,000 patient-days				
Nagao	**-0.002**	-0.004, -0.0004	**-0.02**	-0.03, -0.01
Suarez	**-1.36**	-1.88, -0.84	-1.58	-3.5, 0.33

Slide Courtesy of Dr. Graham Snyder

Reinterpreted from Tomcyzk S, Clin Infect Dis 2018

Impact of Expanded Admission Screening Protocol for *C. auris* at a NY Hospital

Table 1
Summary of admission surveillance swab results for *Candida auris* based on unique patients (N = 591)

	Positive surveillance tests (n, %)	Negative surveillance tests (n, %)	Total	*P* value
Overall	14 (2.4)	577 (97.6)	591	-
By study phase				
Phase 1	2 (5.9)	32 (94.1)	34	.17
Phase 2	12 (2.2)	545 (97.8)	557	
By SNF type				
Ventilator-capable SNF	9 (6.6)	128 (93.4)	137	< .01
Nonventilator-capable SNF	5 (1.1)	449 (98.9)	454	
By tracheostomy or ventilator-dependent status				
Presented with these devices	9 (17.0)	44 (83.0)	53	< .01
No device	5 (0.9)	533 (99.1)	538	

NOTE. *P* value < .05 determined to be statistically significant.
SNF, skilled nursing facility.

8 more patients identified that would not have been identified with phase 1 criteria

Phase 1:
Admission screening for anyone with recent stay in SNF with history of caring for residents with C auris and residents dependents on ventilators.

Phase 2:
Admission screening for all patients with recent stays at any SNF

Recent Stay:
Anyone who recently resided in an SNF within the last month prior to admission or was transferred directly from the SNF to the hospital

"When comparing the 2 phases, there was a decrease in the number of colonized patients detected during exposure investigations for clinical cases of C auris."

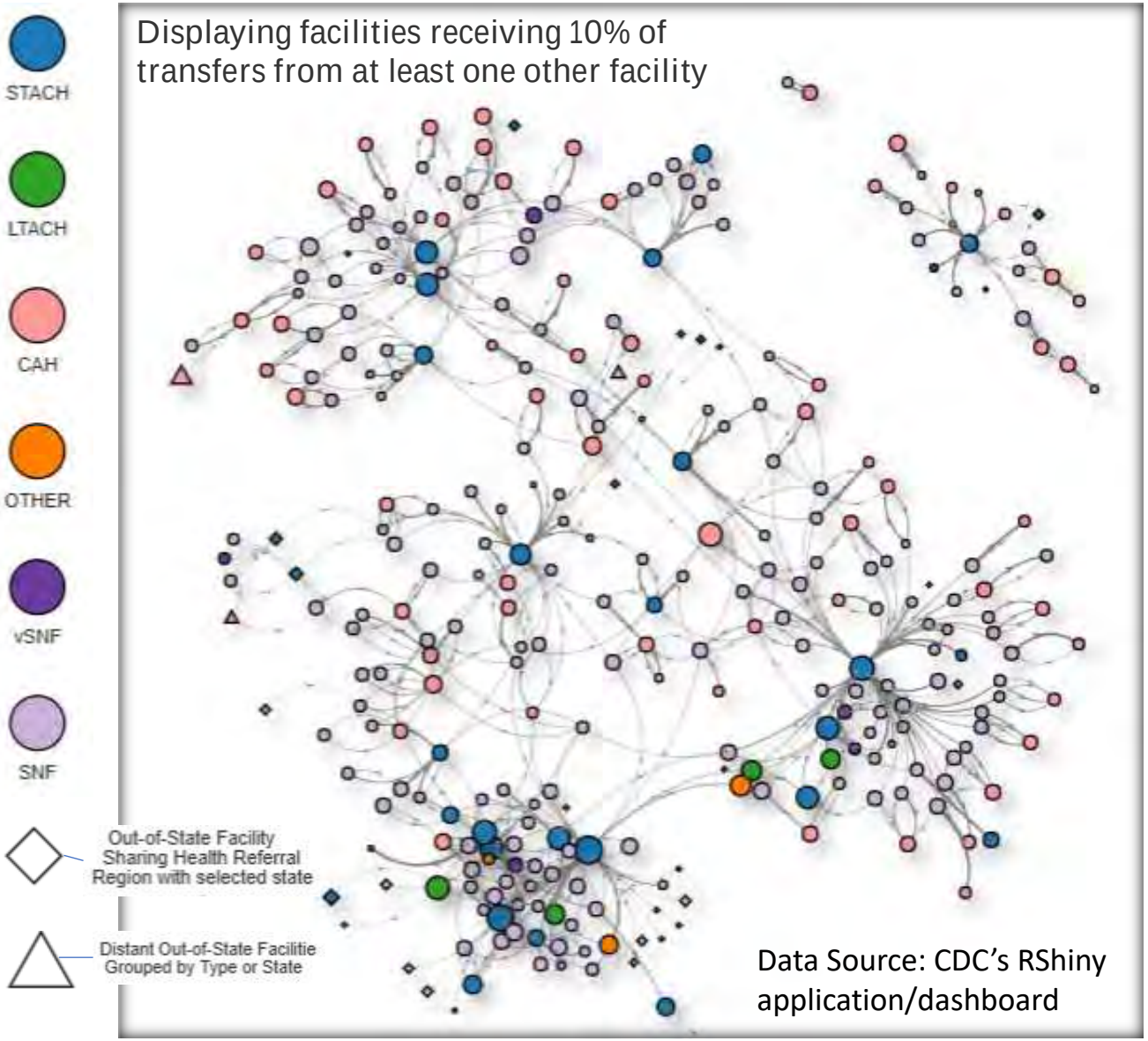
"In phase 1, 8 additional patients were found to be colonized during an exposure investigation for 1 clinical case of C auris. Whereas in phase 2, only 1 secondary case was detected when an exposure investigation was conducted for 1 clinical case of C auris."

"The expansion of the screening program has allowed the facility to identify C auris colonized patients earlier, which reduces potential confusion during exposure investigations for clinical cases in determining if positive cases were potentially due to nosocomial spread."

Cheng A et al. Am J Infect Control. 2025 Jan;53(1):70-74

Facility Risk Stratification in Nebraska

Interfacility Direct Transfer Network of Nebraska - 2021



Influential Facilities

- LTACH
- vSNF
- Hospitals with transplant centers or burn units

Highly Connected Facilities

- Hospitals receiving transfers from influential facilities
- SNFs receiving transfers from influential facilities

Other Facilities

- Other hospitals
- Other LTCFs
- Any other healthcare settings

NEBRASKA
Good Life. Great Mission.
DIVISION OF PUBLIC HEALTH

Nebraska DHHS Assistance for Admission and Point Prevalence Screening for Healthcare Facilities

Open to assisting “influential facilities” in conducting targeted admission screenings and/or periodic PPS

Will consider assisting “highly connected facilities” in conducting targeted admission screenings and/or periodic PPS on a case-by-case basis

Note: Assistance with admission screening and PPS is contingent on funding availability at the time

In Summary ……

Nebraska hospitals continue to do better in preventing most targeted healthcare-associated infections, but opportunities for improvement exist in some areas

Nebraska has low prevalence for the CDC-targeted MDROs but number of new Tier-2 MDROs are increasing over the last few years

Admission and Point Prevalence Screenings for CP-CRE and *C. auris* along with WGS may play a role in early identification and containment of cases and clusters of targeted MDROs

HAI/AR program will continue to collaborate with healthcare facilities, local health departments and other stakeholders to coordinate patient safety initiatives

QUESTIONS?

NEBRASKA
Good Life. Great Mission.

DIVISION OF PUBLIC HEALTH

THANK YOU

DIVISION OF PUBLIC HEALTH

NEBRASKA
Good Life. Great Mission.
DEPT. OF HEALTH AND HUMAN SERVICES

ENTER YOUR INFO HERE

Enter any additional info here