West Virginia

Multidrug-Resistant Organisms

2024 Surveillance Report

West Virginia Department of HEALTH

Healthcare-Associated Infections and
Antimicrobial Resistance Program
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Multidrug-Resistant Organisms in West Virginia
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Multidrug-Resistant Organisms (MDRO) Overview

MDROs are responsible for a growing number of infections in healthcare settings in West Virginia and across the country. Carbapenem-Resistant Organisms (CRO) are a type of bacterial MDRO that can result in asymptomatic colonization or active infection, particularly in healthcare settings. They are difficult to treat and are included in the Centers for Disease Control's [2019 AR Threats Report | Antibiotic Resistance Threats in the United States]. These organisms can cause a wide range of infections, such as those of the urinary tract, bloodstream, respiratory tract, and wounds. They have developed resistance to a last-line antibiotic class: the carbapenems. Bacteria in the taxonomic order called Enterobacterales (CRE), and others like Carbapenem Resistant *Acinetobacter baumannii* (CRAB) in the *Moraxellaceae* family and Carbapenem Resistant *Pseudomonas aeruginosa* (CRPA) in the *Pseudomonadaceae* family, are commonly found in the environment and can cause the same types of infections. They are associated with high mortality rates depending on the type of bacteria.

Carbapenemase-producing organisms (CPOs) are those that have acquired mobile genetic elements, also known as plasmids, that carry genes with the ability to produce enzymes that actively hydrolyze or break down carbapenem antibiotics. These plasmids are easily exchanged between different bacteria, thus facilitating the rapid spread of carbapenem resistance. *Klebsiella pneumoniae* carbapenemase (KPC) is most common in the United States, followed by New Delhi metallo-β-lactamase (NDM), and oxacillinase-like carbapenemase-(OXA-like) producing infections. Of the 117 CPO cases in West Virginia, about 56% were KPC, up from 37% the previous year. OXA-like were the second most common at 32%; a notable increase from 12%. The remaining cases included nine NDM (8%), three with unknown resistance mechanisms (3%), and two VIM (Verona integron-encoded metallo-β-lactamase) cases, accounting for 2%. CDC recommends more stringent infection prevention practices in areas where CPO is prevalent, as these organisms are suspected to be responsible for much of the spread throughout the country.

Candida auris (*C. auris*), recently renamed *Candidozyma auris*, is a type of yeast that can cause severe illness and sometimes death due to its efficient resistance to antifungal medications and ability to persist in the environment. Since its 2009 discovery in Japan, *C. auris* has spread globally. The first case in West Virginia occurred in 2023. That number increased in 2024. Much remains unknown about this emerging pathogen. However, we do know that it mostly affects the sickest patients with underlying medical conditions such as those requiring mechanical ventilation, feeding tubes, urinary catheters, and vascular access devices. The presence of comorbid conditions and chronic diseases in patients who die after *C. auris* detection makes cause of death determination difficult. The degree to which *C. auris* contributed to patient demise, compared to existing illness, is uncertain.

Risk Factors

Some bacteria and fungi are resistant to nearly all antimicrobials, leaving more toxic or less effective treatment options. The primary risk factors for MDRO acquisition in the United States include exposure to healthcare and exposure to antimicrobials. Patients who require devices (e.g., urinary catheters) and patients taking long courses of some antimicrobials are most at risk. Healthcare-related risk factors include requiring help with activities of daily living like toileting and bathing, exposure to an intensive care unit, and mechanical ventilation. Several antimicrobials have been associated with these infections, including carbapenems that have already been discussed, as well as cephalosporins, fluoroquinolones, and vancomycin.

Reporting Requirements and Surveillance Information

In 2017, a case of CRO (known as CRE at that time) in West Virginia was defined as an *Enterbacterale* isolate that was resistant to at least one carbapenem antibiotic (doripenem, ertapenem, imipenem, and meropenem) OR a documented carbapenemase producer (e.g., KPC, NDM, VIM, IMP, OXA-48) demonstrated by a recognized test (e.g., polymerase chain reaction (PCR), metallo-β-lactamase test, modified Hodge test, Carba NP, matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF). There were four exceptions to this case definition: *Proteus* spp., *Providencia* spp., *Morganella* spp., and *Stenotrophomonas* spp. These organisms are intrinsically resistant to imipenem and need to be resistant to one carbapenem other than imipenem OR be a documented carbapenemase producer. This definition remained the same until December 31, 2022.

Beginning on January 1, 2023, West Virginia adopted the case definition of carbapenem-resistant *Enterobacteriaceae* to include CRAB and CRPA. This expansion aligned our surveillance efforts with national standardized practices. *Candidozyma auris* (*C. auris*) is classified as a category II condition and is reportable within 24 hours to the Local Health Department (LHD). It will be clearly outlined in the 2025 Reportable Disease Rule. Consistent classification of MDRO counts facilitates reporting to professional audiences, policymakers, and the public. Further, it creates actionable epidemiology for healthcare facilities and public health officials, enabling effective prevention, detection, and response. The overarching goal is to contain the spread of MDROs, improving accountability of potential new antimicrobial resistance threats that often arise quickly.

Limitations

Several limitations should be considered when interpreting the data summarized in this report. Of the 346 total CRO/CPO cases reported in 2024, 117 (33.8%) were CPOs. Seventy-two were tested and found to be negative for carbapenemase production. The remaining 157 cases were either not tested or testing status was unknown, meaning the true number of CPO-positive specimens will never be known. One contributing factor is not all laboratories have the equipment and/or resources necessary to conduct carbapenemase testing. Without this information, infection prevention efforts may be less targeted or effective. Moreover, timely knowledge of carbapenemase production status is critical to ensure rapid investigation and prevent further transmission. The West Virginia Healthcare-Associated Infections/Antimicrobial Resistance (HAI/AR) Program, in partnership with the West Virginia Office of Laboratory Services (OLS) and the CDC's Antimicrobial Resistance Laboratory Network (ARLN) Mid-Atlantic division, provides access to carbapenemase testing. However, raising awareness of this resource and enrolling additional participants remains a challenge. Similarly, detection of *C. auris* is difficult, as it is often misidentified as other yeast species. Many laboratorians lack experience with this organism, and few laboratories have the specialized equipment required for accurate testing.

Another limitation is the reliance on information collected during case investigations by local health departments (LHDs). These investigations depend on successful contact with case-patients and the accuracy of self-reported information. Challenges such as recall bias, refusal to participate, or incomplete interviews may reduce data accuracy. In addition, delays or omissions in entering key data into the West Virginia Electronic Disease Surveillance System (WVEDSS) can further impact data quality. Examples of commonly missing or delayed information include specimen source, culture type, carbapenemase production status, and public health actions taken.

Overall, the completeness of case investigations in WVEDSS remains a limitation. Enhanced surveillance of multidrug-resistant organisms (MDROs) is needed to provide a more accurate estimate of disease burden. The following tables define and illustrate statewide completeness for 2024.

Table 1.1, Completeness Elements and Criteria, Statewide

Data Element	**Criteria for "Complete"**
CRO organisms	Name of organism entered.
Specimen source	Has a valid source entered.
Culture type	"Clinical" or "Surveillance" entered.
Detection of carbapenemase production by a recognized test?	May be "Unknown" until further information becomes available. Update with "No," "Not Tested," or "Yes" when determined. If "Yes," select "Hodge Test," "IMP PCR," "KPC PCR," "NDM PCR," "OXA 48-like PCR," and/or "VIM PCR."
Was the patient prescribed antibiotics more than two times in the past months?	Response other than "Unknown."
Was the patient hospitalized at the time of specimen collection?	Response other than "Unknown."
Does the patient reside in a Nursing Home (NH) or other Long Term Care Facility (LTCF)?	Response other than "Unknown."
If "yes," address of facility.	Enter the complete address, including zip code.
Any indwelling device in place at any time in the past two calendar days prior to initial culture?	Response other than "Unknown."

Table 1.2, Completeness Data, Statewide, 2024

Overall Score	**%**	**Completed**	**N**
CRO & CPO Organism	99.7%	345	346
Specimen Source	95.7%	331	346
Culture Type	95.7%	331	346
Tested for Carbapenemase Production	54.6%	189	346
*Mechanism/Test Type	64.6%	122	189

Antibiotics more than twice?	60.4%	209	346
Hospitalized?	54.6%	189	346
Resident of NH or LTCF	30.9%	107	346
Indwelling devices	43.1%	149	346

* Mechanism/Test Type "N" differs from total because not all isolates were tested for mechanism/test type.

CRO and CPO in West Virginia

Organisms identified in 2024 included:

- *Acinetobacter baumannii*
- *Pseudomonas aeruginosa*
- *Klebsiella pneumoniae*
- *Enterobacter cloacae complex*
- *Escherichia coli*

Table 2.1, CRO & CPO Incidents Statewide, West Virginia, 2024 (N=346)

Organism Cultured	**CRO**	**CPO**
	(n=229)	(n=117)
Acinetobacter baumannii	42 (18.3%)	39 (33.3%)
Pseudomonas aeruginosa	79 (34.5%)	0 (0%)
Klebsiella pneumoniae	32 (14.1%)	46 (39.3%)
Enterobacter cloacae complex	31 (13.5%)	12 (10.3%)
Escherichia coli	14 (6.1%)	7 (6.1%)
*Other (5 or <)	31 (13.5%)	13 (11.1%)

*Organisms making up five or fewer cases are not included.

MDRO by Surveillance Region

In 2024, the southern surveillance region had the highest number of CROs (Figure 3.1), with 83 cases, and the highest number of CPOs (Figure 3.1), with 55 cases. The northern surveillance region had the fewest number of CROs and CPOs, with 15 and 5 cases, respectively.

Figure 3.1, CRO Cases by Surveillance Region, 2024 (N=229)

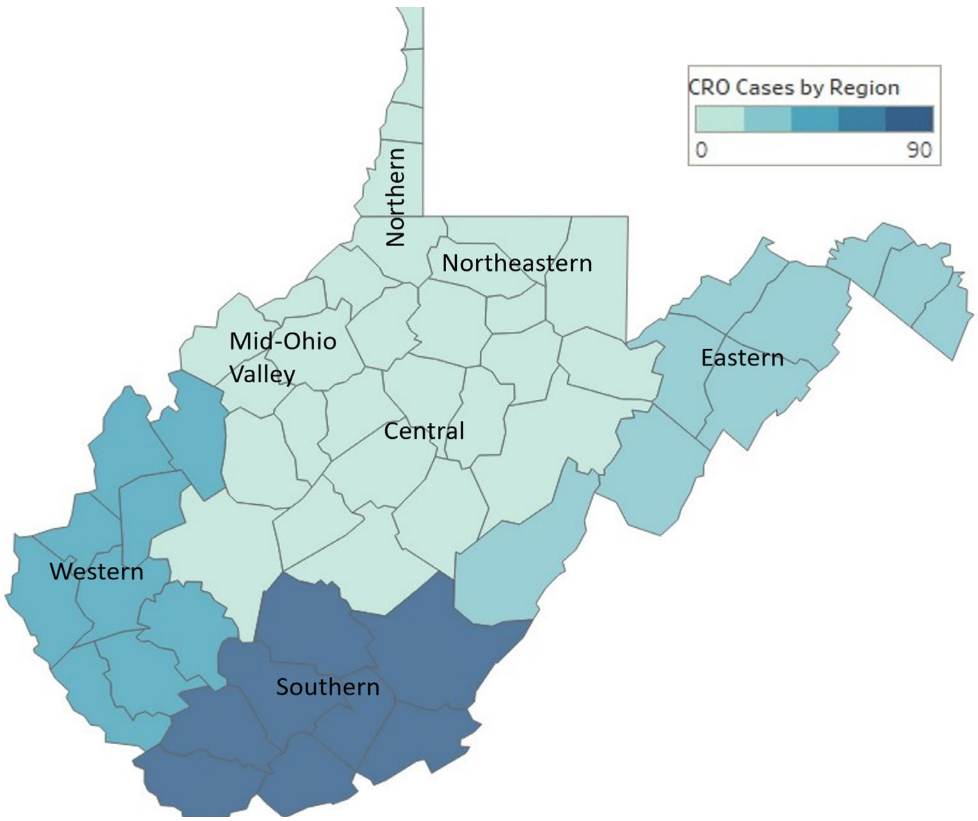


Figure 3.2, CPO Cases by Surveillance Region, 2024 (N=117)

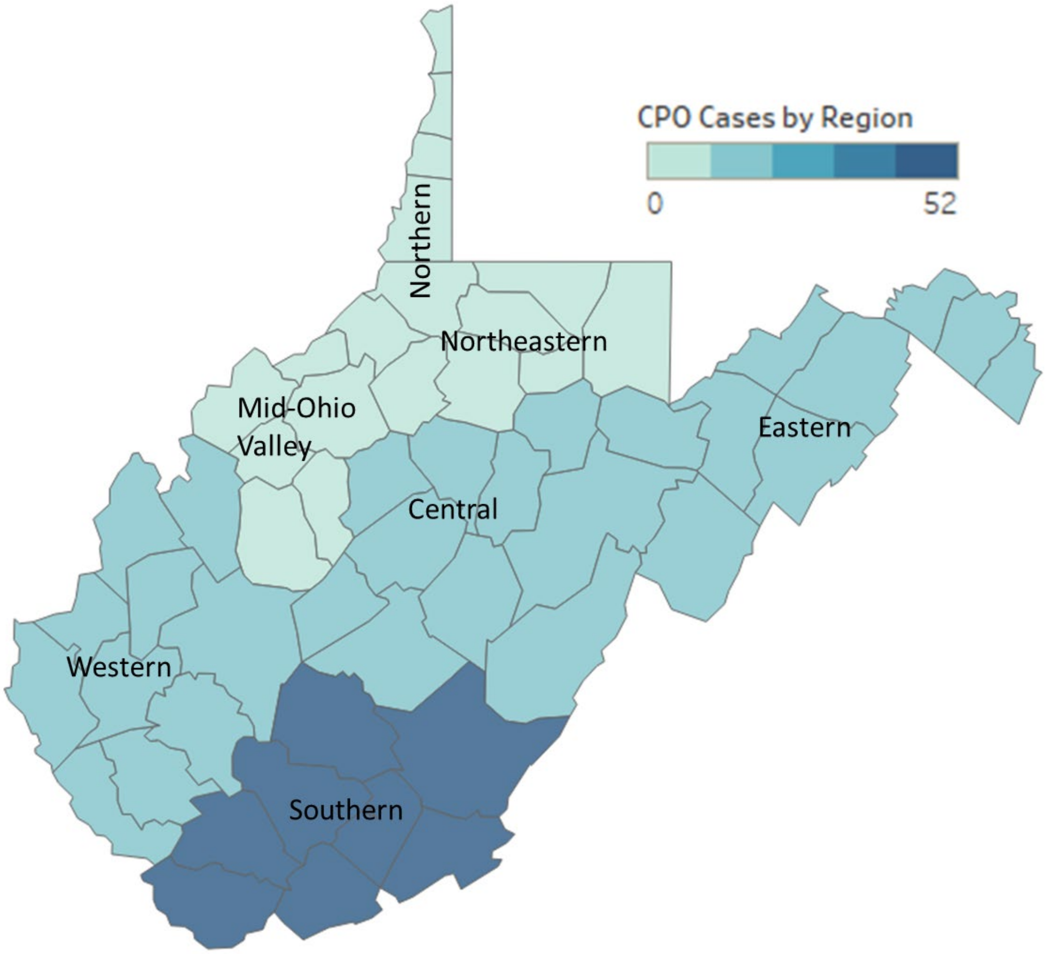


Figure 3.3, *C. auris* Screening Cases by Surveillance Region, 2024 (N=24)

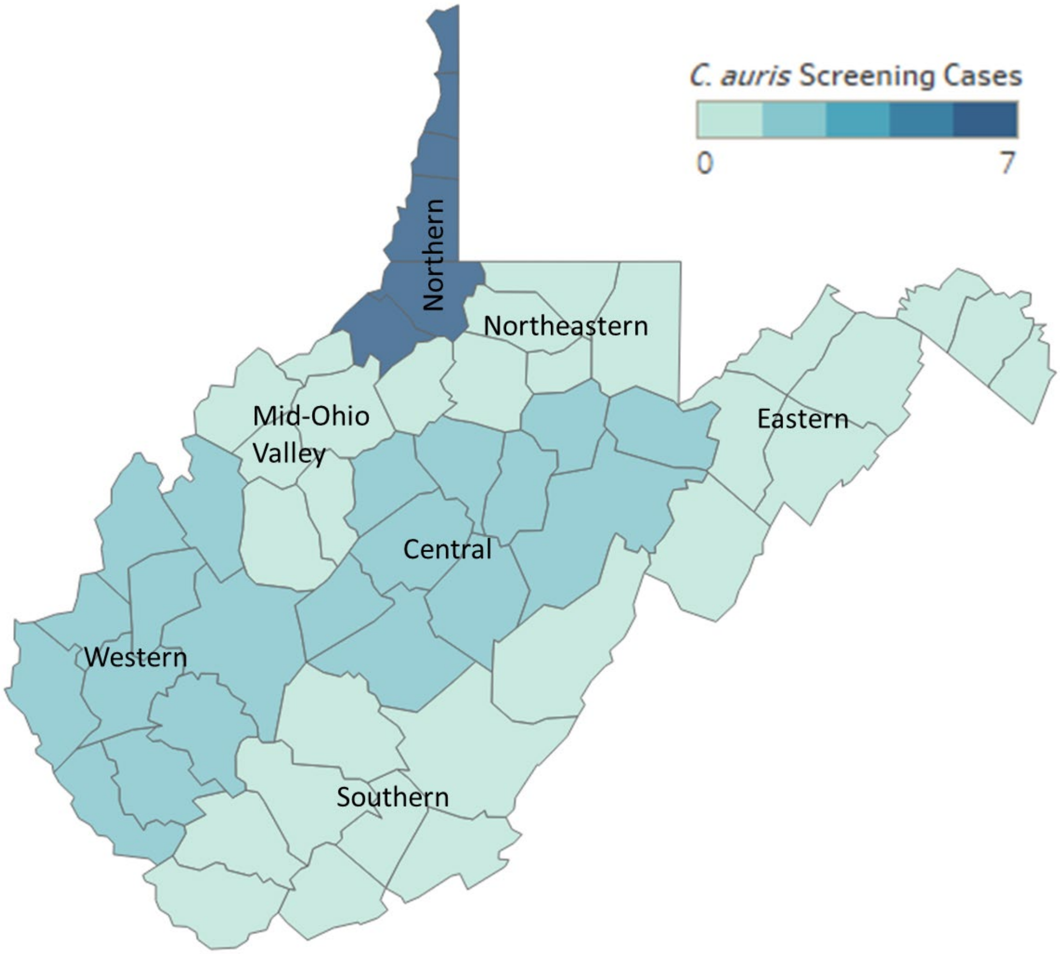
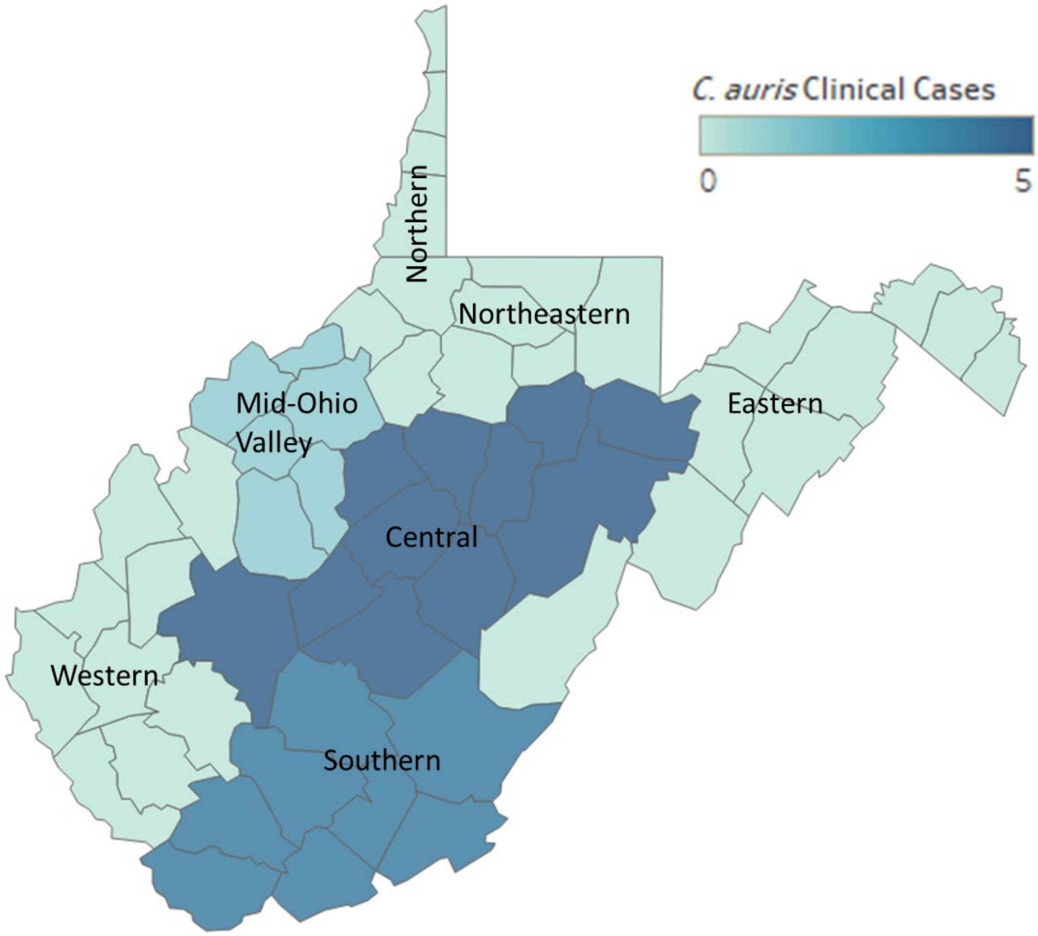
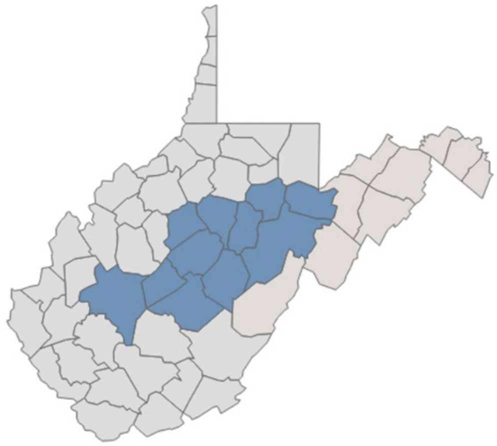


Figure 3.4, *C. auris* Clinical Cases by Surveillance Region, 2024 (N=24)



MDRO in the Central Surveillance Region



Graph 4.1, CRO and CPO Isolates, Central Surveillance Region, 2024 (N=35)

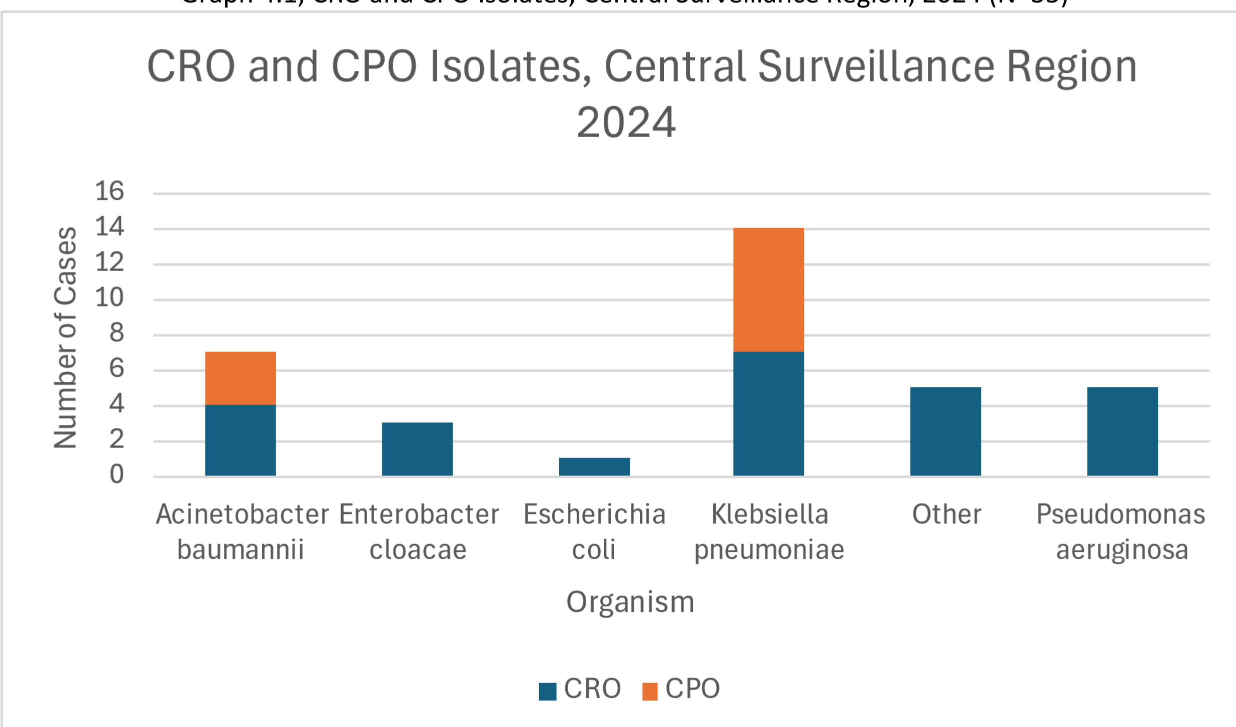
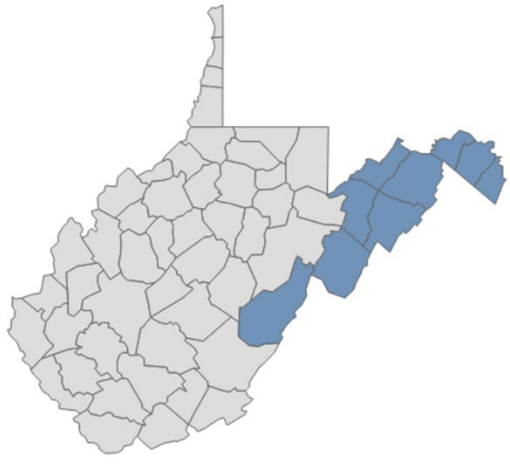


Table 4.1, CRO and CPO Isolates, Central Surveillance Region, 2024 (N=35)

Organism	**CRO** (n=25)	**CPO** (n=10)
Acinetobacter baumannii	4 (16%)	3 (30%)
Enterobacter cloacae complex	3 (12%)	0 (0%)
Escherichia coli	1 (4%)	0 (0%)
Klebsiella pneumoniae	7 (28%)	7 (70%)
Other	5 (20%)	0 (0%)
Pseudomonas aeruginosa	5 (20%)	0 (0%)

MDRO in Eastern Surveillance Region



Graph 5.1, CRO and CPO Isolates, Eastern Surveillance Region, 2024 (N=44)

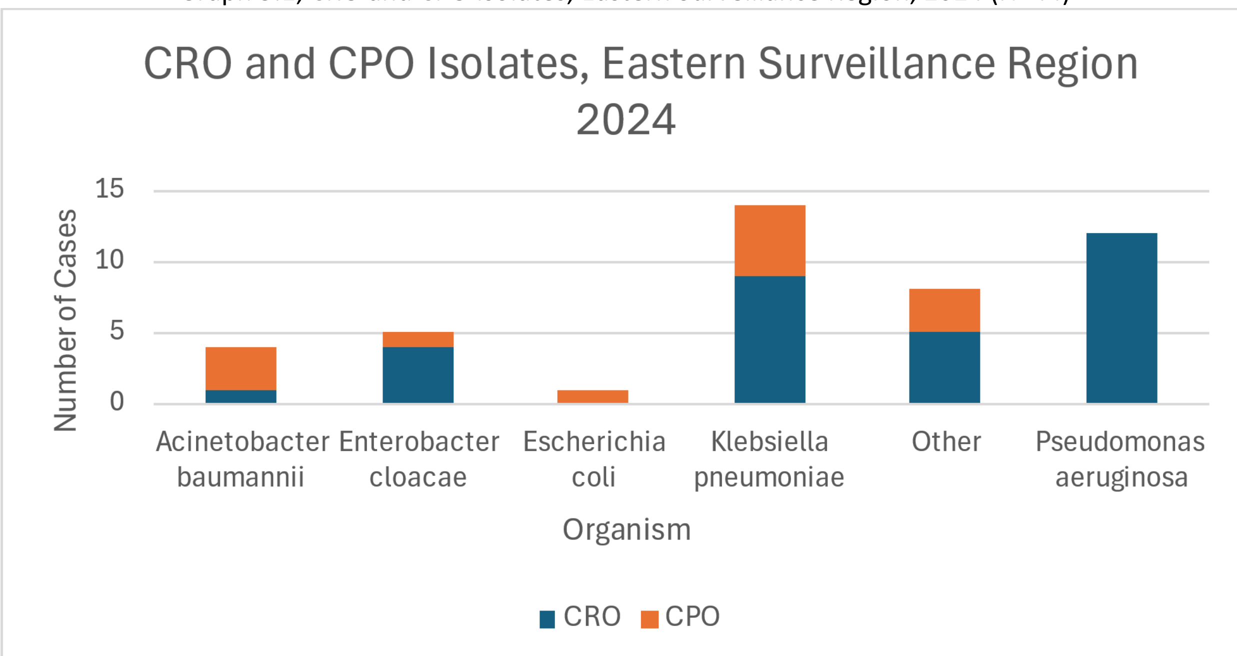
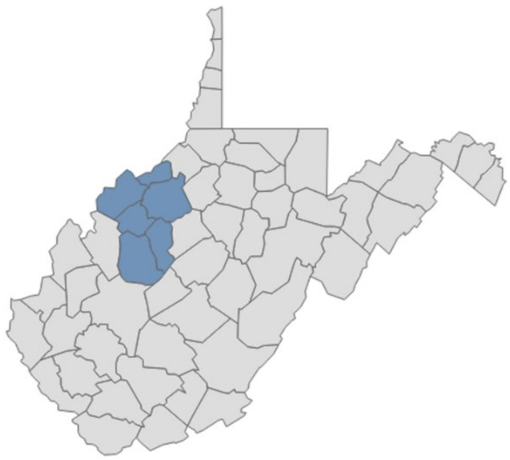


Table 5.1, CRO and CPO Isolates, Eastern Surveillance Region, 2024 (N=44)

Organism	**CRO** (n=31)	**CPO** (n=13)
Acinetobacter baumannii	1 (3.2%)	3 (23.1%)
Enterobacter cloacae complex	4 (12.9%)	1 (7.7%)
Escherichia coli	0 (0%)	1 (7.7%)
Klebsiella pneumoniae	9 (29%)	5 (38.5%)
Pseudomonas aeruginosa	12 (38.7%)	0 (0%)
Other	5 (16.1%)	3 (23.1%)

MDRO in Mid-Ohio Valley (MOV) Surveillance Region



Graph 6.1, CRO and CPO Isolates, MOV Surveillance Region, 2024 (N=22)

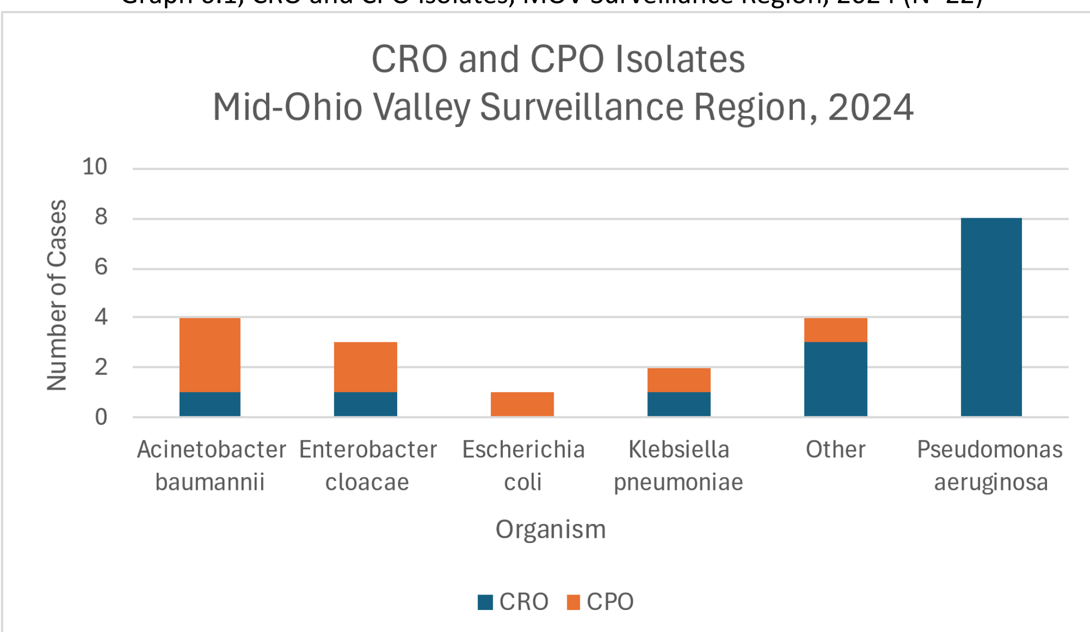
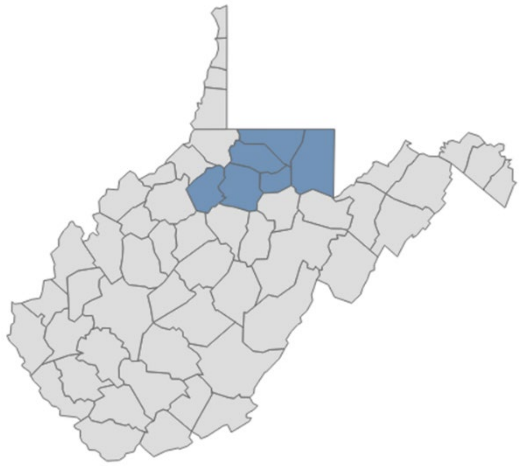


Table 6.1, CRO and CPO Isolates, MOV Surveillance Region, 2024 (N=22)

Organism	**CRO**	**CPO**
	(n=14)	**(n=8)**
Acinetobacter baumannii	1 (7.1%)	3 (37.5%)
Enterobacter cloacae complex	1 (7.1%)	2 (25%)
Escherichia coli	0 (0%)	1 (12.5%)
Klebsiella pneumoniae	1 (7.1%)	1 (12.5%)
Other	3 (21.4%)	1 (12.5%)
Pseudomonas aeruginosa	8 (57.1%)	0 (0%)

MDRO in Northeastern Surveillance Region



Graph 7.1, CRO and CPO Isolates, Northeastern Surveillance Region, 2024 (N=31)

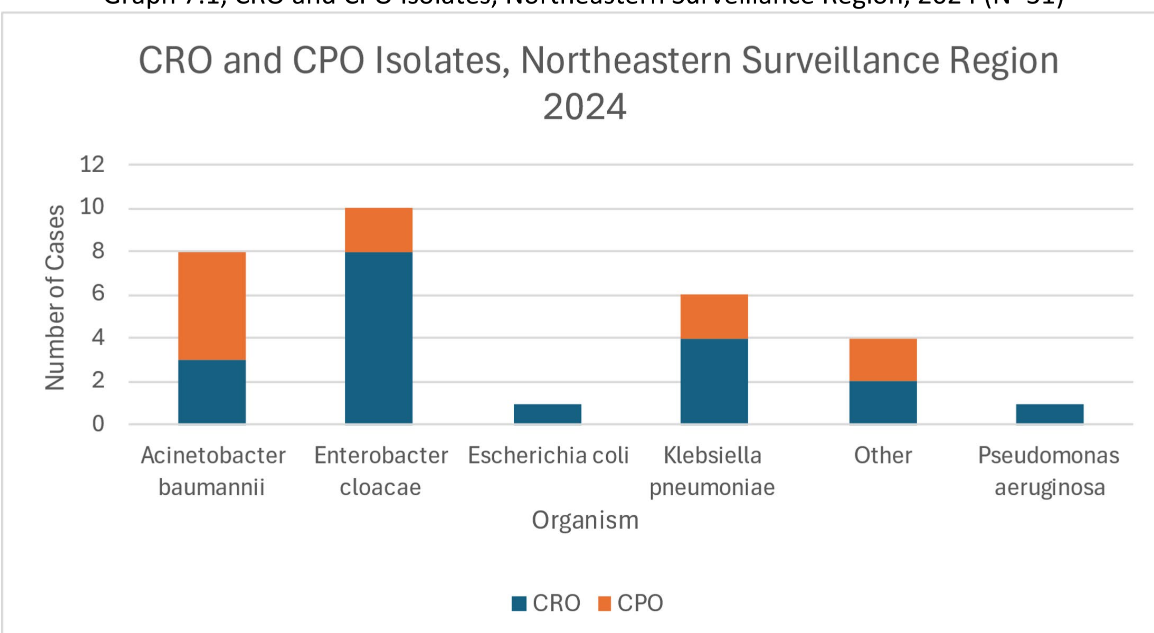


Table 7.1, CRO and CPO Isolates, Northeastern Surveillance Region, 2024 (N=31)

Organism	**CRO**	**CPO**
	(n=19)	**(n=11)**
Acinetobacter baumannii	3 (15.8%)	5 (45.5%)
Enterobacter cloacae complex	8 (42.1%)	2 (18.2%)
Escherichia coli	1 (5.3%)	0 (0%)
Klebsiella pneumoniae	4 (21.1%)	2 (18.2%)
Other	2 (10.5%)	2 (18.2%)
Pseudomonas aeruginosa	1 (5.3%)	0 (0%)

MDRO in Northern Surveillance Region

Graph 8.1, CRO and CPO Isolates, Northern Surveillance Region, 2024 (N=20)

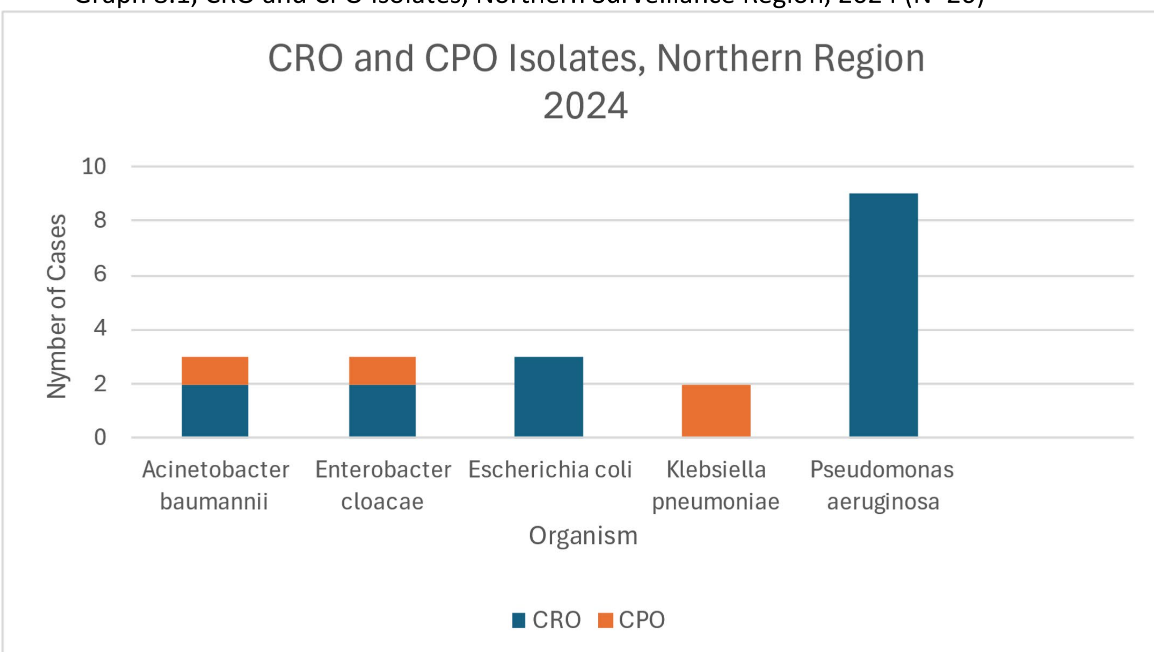
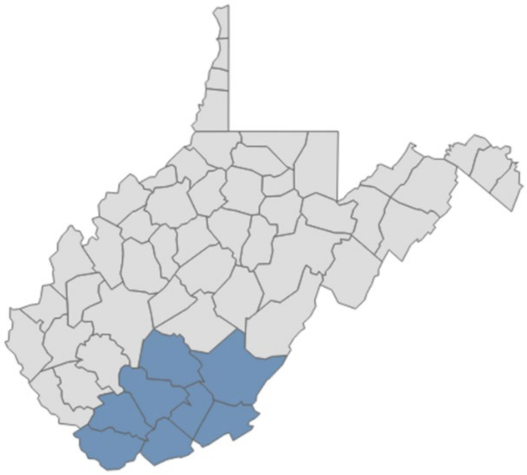


Table 8.1, CRO and CPO Isolates, Northern Surveillance Region, 2024 (N=20)

Organism	**CRO**	**CPO**
	(n=16)	**(n=4)**
Acinetobacter baumannii	2 (12.5)	1 (25%)
Enterobacter cloacae	2 (12.5%)	1 (25%)
Escherichia coli	3 (18.8%)	0 (0%)
Klebsiella pneumoniae	0 (0%)	2 (50%)
Other	0 (0%)	0 (0%)
Pseudomonas aeruginosa	9 (56.3%)	0 (0%)

MDRO in Southern Surveillance Region



Graph 9.1, CRO and CPO Isolates, Southern Surveillance Region, 2024 (N=132)

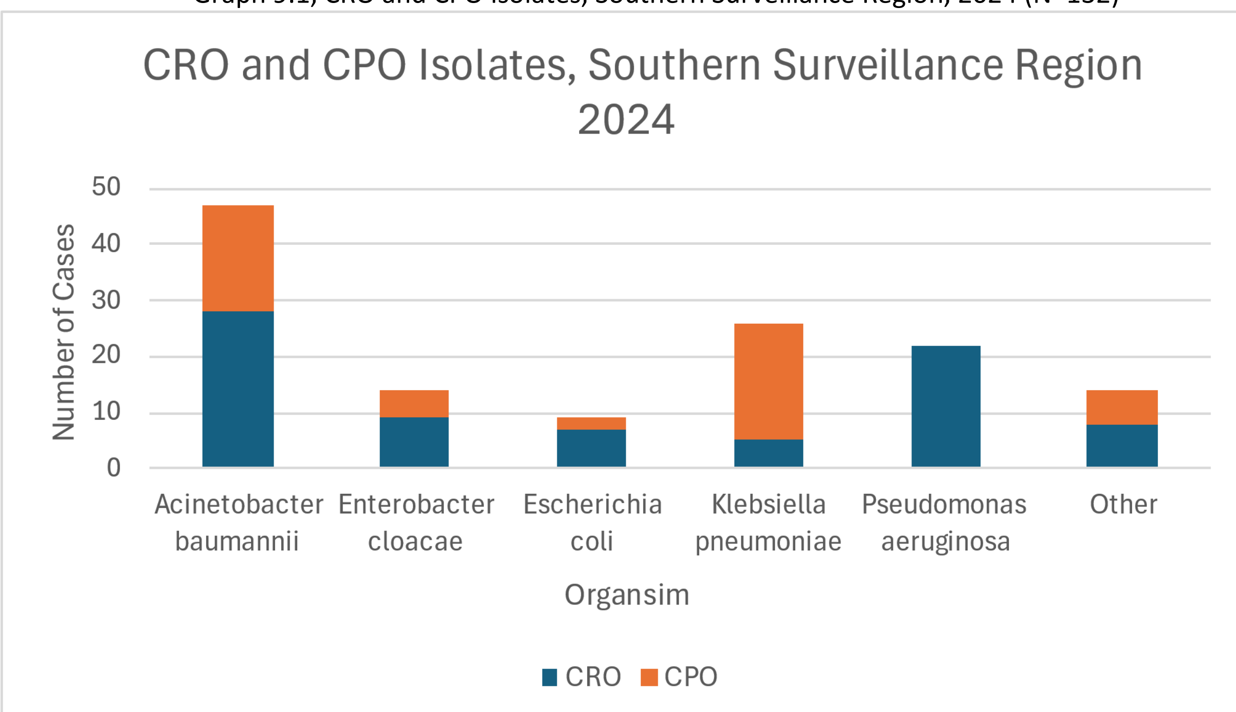
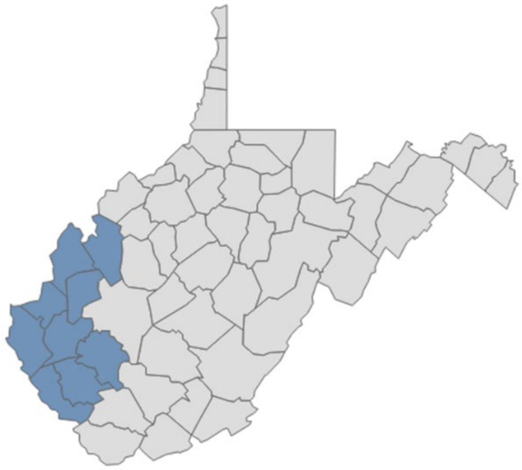


Table 9.1, CRO and CPO Isolates, Southern Surveillance Region, 2024 (N=132)

Organism	**CRO** (n=79)	**CPO** (n=53)
Acinetobacter baumannii	28 (35.4%)	19 (35.8%)
Enterobacter cloacae complex	9 (11.4%)	5 (9.4%)
Escherichia coli	7 (8.9%)	2 (3.8%)
Klebsiella pneumoniae	5 (6.3%)	21 (39.6%)
Pseudomonas aeruginosa	22 (27.8%)	0 (0%)
Other	8 (10.1%)	6 (11.3%)

MDRO in Western Surveillance Region



Graph 10.1, CRO and CPO Isolates, Western Surveillance Region, 2024 (N=63)

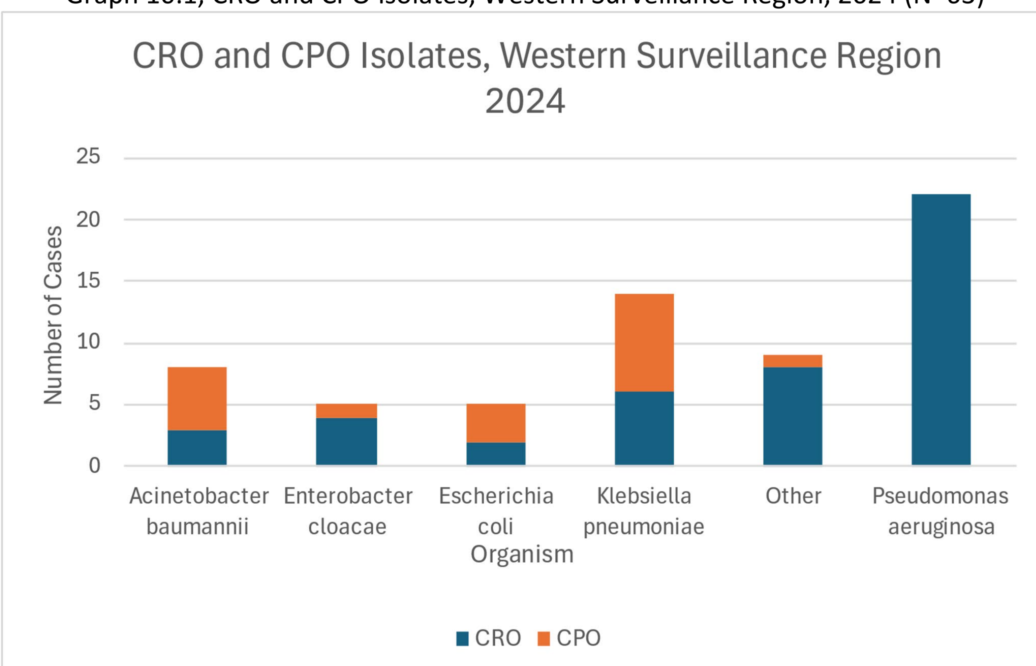


Table 10.1, CRO and CPO Isolates, Western Surveillance Region, 2024 (N=63)

Organism	**CRO**	**CPO**
	(n=45)	**(n=18)**
Acinetobacter baumannii	3 (6.7%)	5 (27.8%)
Enterobacter cloacae complex	4 (8.9%)	1 (5.6%)
Escherichia coli	2 (4.4%)	3 (16.7%)
Klebsiella pneumoniae	6 (13.3%)	8 (44.4%)
Other	8 (17.8%)	1 (5.6%)
Pseudomonas aeruginosa	22 (48.9%)	0 (0%)

Demographics

CRO and CPO Cases by Gender

Table 11.1, CRO and CPO Cases by Gender, West Virginia, 2024 (N=346)

Gender	CRO (n=229)	CPO (n=117)
Female	117 (51.1%)	60 (51.3%)
Male	112 (48.9%)	57 (48.7%)

Graph 11.1, CRO and CPO Cases by Gender, West Virginia, 2024 (N=346)

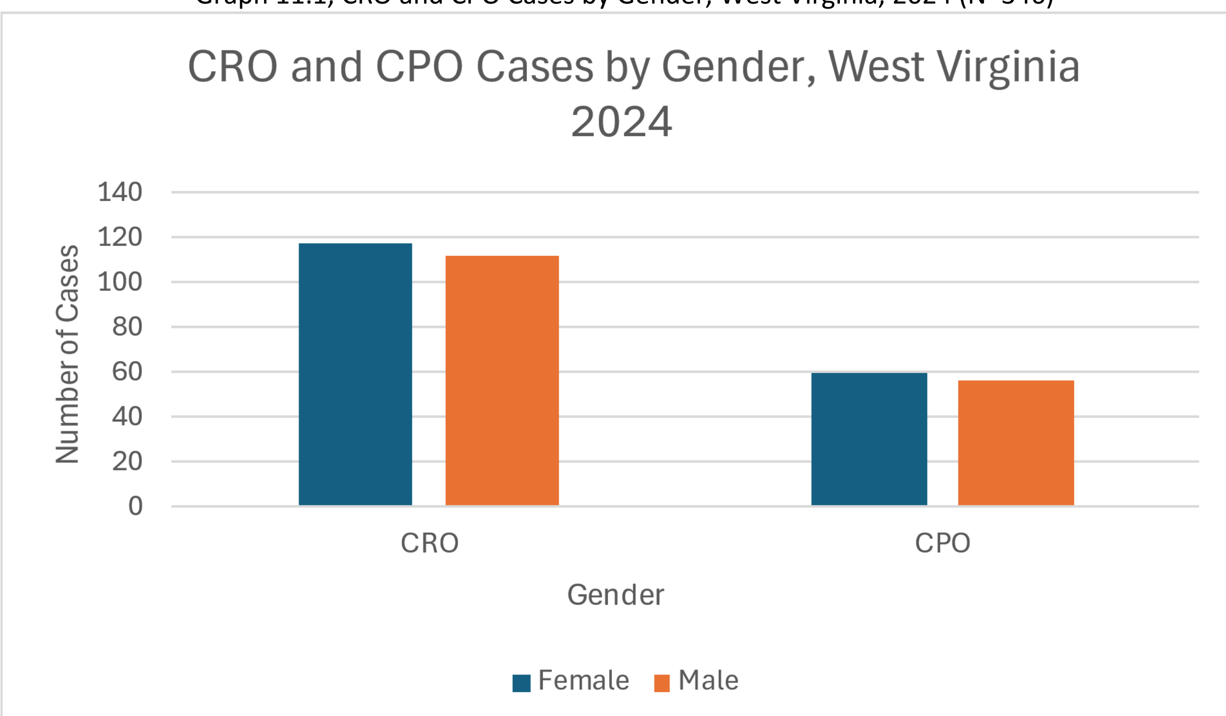


Table 11.2, Gender of CRO Cases by Surveillance Region, West Virginia, 2024 (N=229)

Gender	Central (n=25)	East (n=31)	MOV (n=14)	North (n=16)	Northeast (n=19)	South (n=79)	West (n=45)
Male	14 (56.0%)	19 (61.3%)	4 (28.6%)	7 (43.8%)	10 (52.6%)	41 (51.9%)	24 (53.3%)
Female	11 (44.0%)	12 (38.7%)	10 (71.4%)	9 (56.3%)	9 (47.4%)	38 (48.1%)	21 (46.7%)

Table 11.3, Gender of CPO Cases by Surveillance Region, West Virginia, 2024 (N=117)

Gender	Central (n=10)	East (n=13)	MOV (n=8)	North (n=4)	Northeast (n=11)	South (n=53)	West (n=18)
Male	6 (60.0%)	7 (53.8%)	5 (62.5%)	1 (25.0%)	3 (27.3%)	25 (47.2%)	10 (55.6%)
Female	4 (40.0%)	6 (46.2%)	3 (37.5%)	3 (75%)	8 (72.7%)	28 (52.8%)	8 (44.4%)

***C. auris* Cases by Gender**

Graph 11.2, Gender of *C. auris* Cases by Surveillance Region, West Virginia, 2024 (N=24)

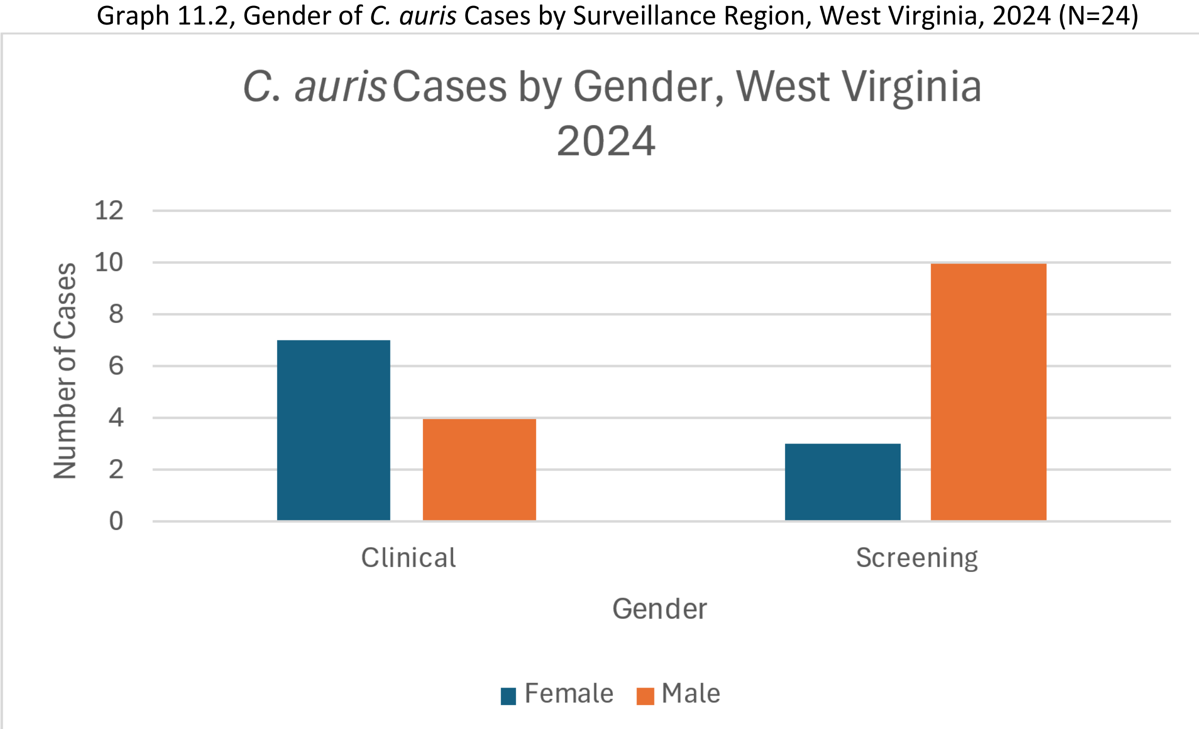


Table 11.4, Gender of *C. auris* Cases by Surveillance Region, West Virginia, 2024 (N=24)

Gender	***C. auris,* Screening (n=13)**	***C. auris,* Clinical (n=11)**
Male	10 (%)	4 (%)
Female	3 (%)	7 (%)

CRO and CPO Cases by Age

Graph 12.1, CRO and CPO Cases by Age, West Virginia, 2024 (N=346)

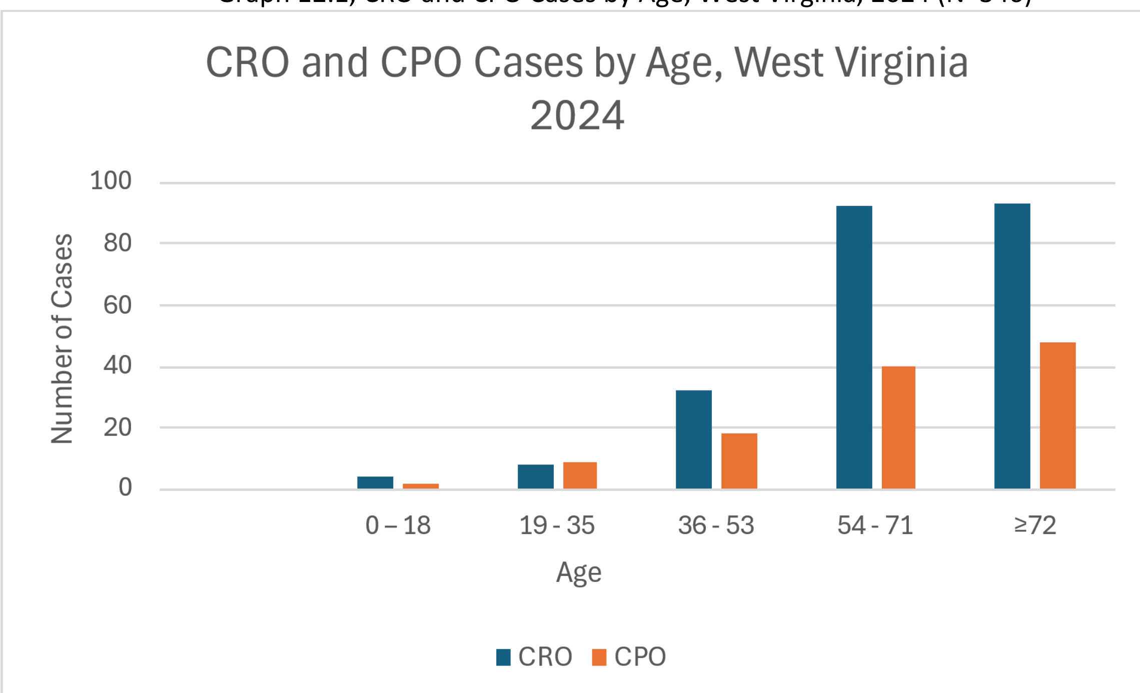


Table 12.1, Age of CRO Cases by Surveillance Region, West Virginia, 2024 (N=229)

Age	Central (n=25)	East (n=31)	MOV (n=14)	North (n=16)	Northeast (n=19)	South (n=79)	West (n=45)
Age, years (Avg.)	70	64	66	57	72	66	68
0 – 18	1 (4.0%)	1 (3.2%)	1 (7.1%)	1 (6.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
19 - 35	0 (0.0%)	1 (3.2%)	0 (0.0%)	1 (6.3%)	0 (0.0%)	3 (3.8%)	3 (6.7%)
36 - 53	0 (0.0%)	4 (12.9%)	0 (0.0%)	3 (18.8%)	4 (21.1%)	16 (20.3%)	5 (11.1%)
54 - 71	11 (44.0%)	15 (48.4%)	7 (50.0%)	8 (50.0%)	3 (15.8%)	29 (36.7%)	19 (42.2%)
≥72	13 (52.0%)	10 (32.3%)	6 (42.9%)	3 (18.8%)	12 (63.2%)	31 (39.2%)	18 (40.0%)

Table 12.2, Age of CPO Cases by Surveillance Region, West Virginia, 2024 (N=117)

Age	Central (n=10)	East (n=13)	MOV (n=8)	North (n=4)	Northeast (n=11)	South (n=53)	West (n=18)
Age, years (Avg.)	68	65	67	58	58	63	60
0 – 18	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (18.2%)	0 (0.0%)	0 (0.0%)
19 - 35	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (25.0%)	1 (9.1%)	6 (11.2%)	1 (5.6%)
36 - 53	1 (10.0%)	4 (30.8%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	7 (13.2%)	6 (33.3%)
54-71	3 (30%)	3 (23.1%)	4 (50.0%)	2 (50%)	4 (36.4%)	21 (39.6%)	7 (38.9%)
≥72	6 (60.0%)	6 (46.2%)	3 (37.5%)	1 (25.0%)	4 (36.4%)	19 (35.8%)	4 (22.2%)

Graph 12.2, Age of *C. auris* Cases by Surveillance Region, West Virginia, 2024 (N=24)

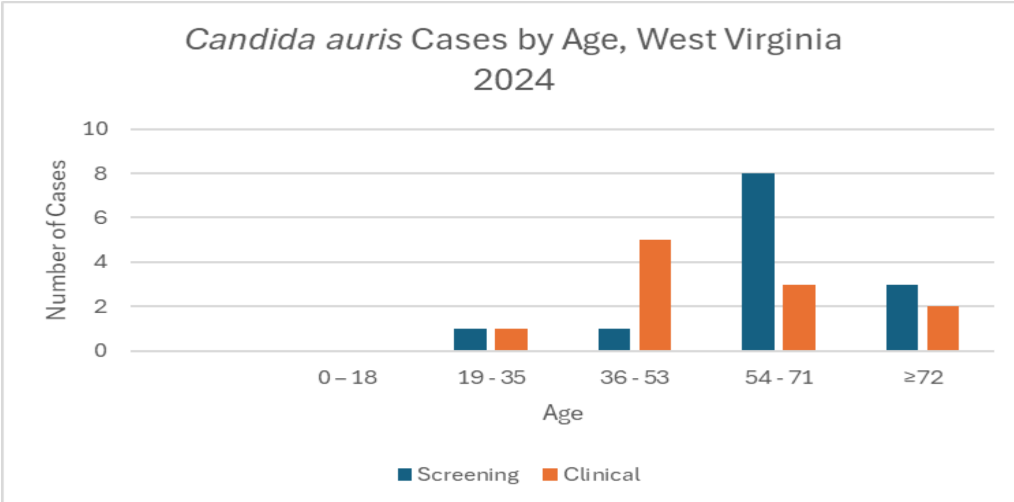


Table 12.3, Age of *C. auris* Cases by Surveillance Region, West Virginia, 2024 (N=24)

Age	***C. auris* Screening (n=13)**	***C. auris* Clinical (n=11)**
Age, years (Avg.)	63	55
0 – 18	0 (0.0%)	0 (0.0%)
19 - 35	1 (7.7%)	1 (9.1%)
36 - 53	1 (&.7%)	5 (45.5%)
54 - 71	8 (61.5%)	3 (27.3%)
≥72	3 (23.1%)	2 (18.2%)

CRO and CPO Cases by Race

Graph 13.1, CRO and CPO Cases by Race, West Virginia, 2024 (N=349)

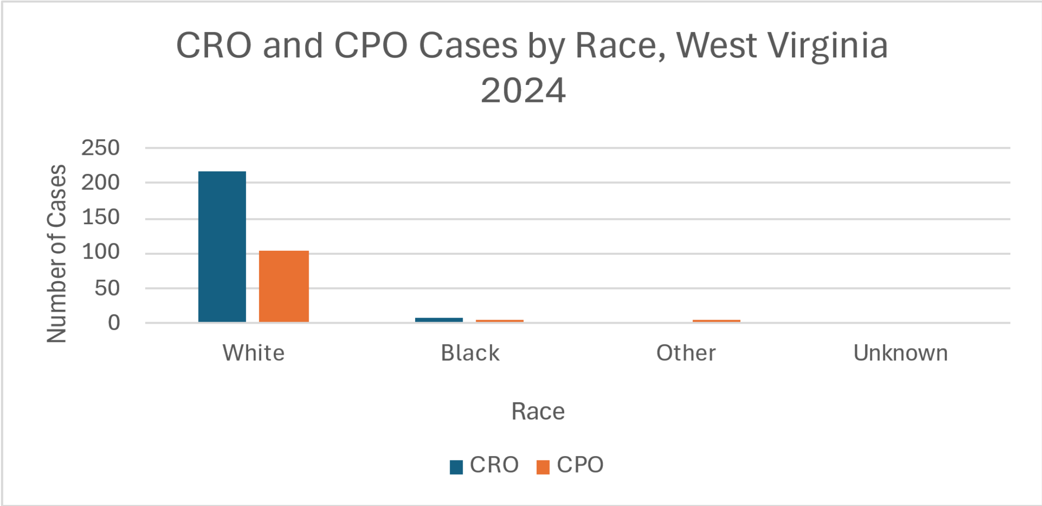


Table 13.1, Race of CRO Cases by Surveillance Region, West Virginia, 2024 (N=229)

Race	**Central (n=25)**	**East (n=31)**	**MOV (n=14)**	**North (n=16)**	**Northeast (n=19)**	**South (n=79)**	**West (n=45)**
White	25 (100%)	27 (87.1%)	14 (100%)	16 (100%)	18 (94.7%)	76 (96.2%)	42 (93.3%)
Black	0 (0.0%)	4 (12.9%)	0 (0.0%)	0 (0.0%)	1 (5.3%)	2 (2.5%)	1 (2.2%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.3%)	1 (2.2%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (2.2%)

Table 13.2, Race of CPO Cases by Surveillance Region, West Virginia, 2024 (N=117)

Race	Central (n=10)	East (n=13)	MOV (n=8)	North (n=4)	Northeast (n=11)	South (n=53)	West (n=18)
White	10 (100%)	13 (100%)	7 (87.5%)	4 (100%)	10 (91.0%)	46 (86.8%)	15 83.3%)
Black	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (9.4%)	0 (0.0%)
Other	0 (0.0%)	0 (0.0%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	2 (3.8%)	3 (16.7%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (9.0%)	0 (0.0%)	0 (0.0%)

***C. auris* Cases by Race**

Graph 13.2, Race of *C. auris* Cases by Surveillance Region, West Virginia, 2024 (N=24)

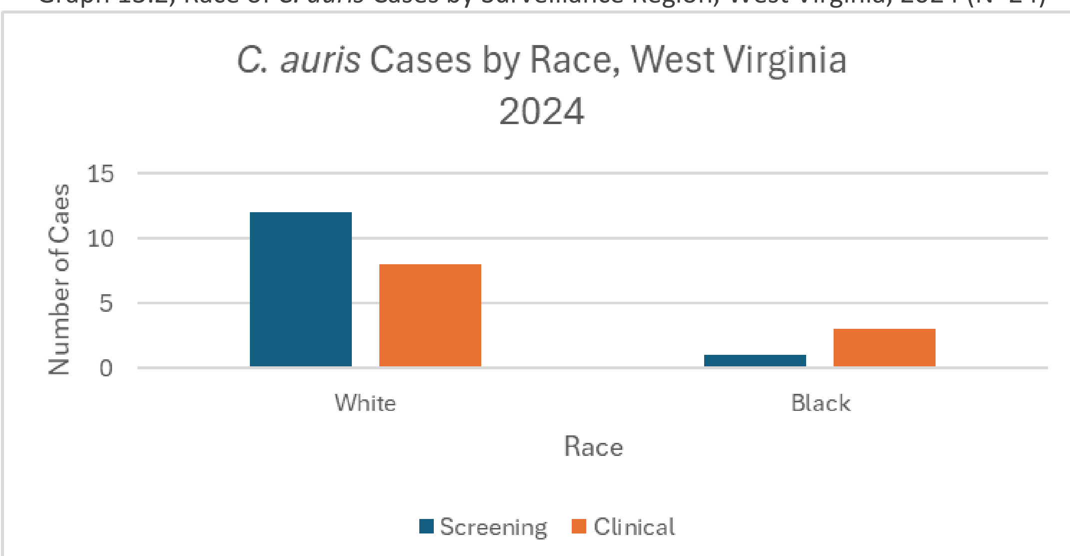


Table 13.3, Race of *C. auris* Cases by Surveillance Region, West Virginia, 2024 (N=24)

Race	***C. auris* Screening (n=13)**	***C. auris* Clinical (n=11)**
White	12 (92%)	8 (73%)
Black	1 (8%)	3 (27%)

CRO and CPO Cases by Ethnicity

Graph 14.1, CRO and CPO Cases by Ethnicity, West Virginia, 2024 (N=346)

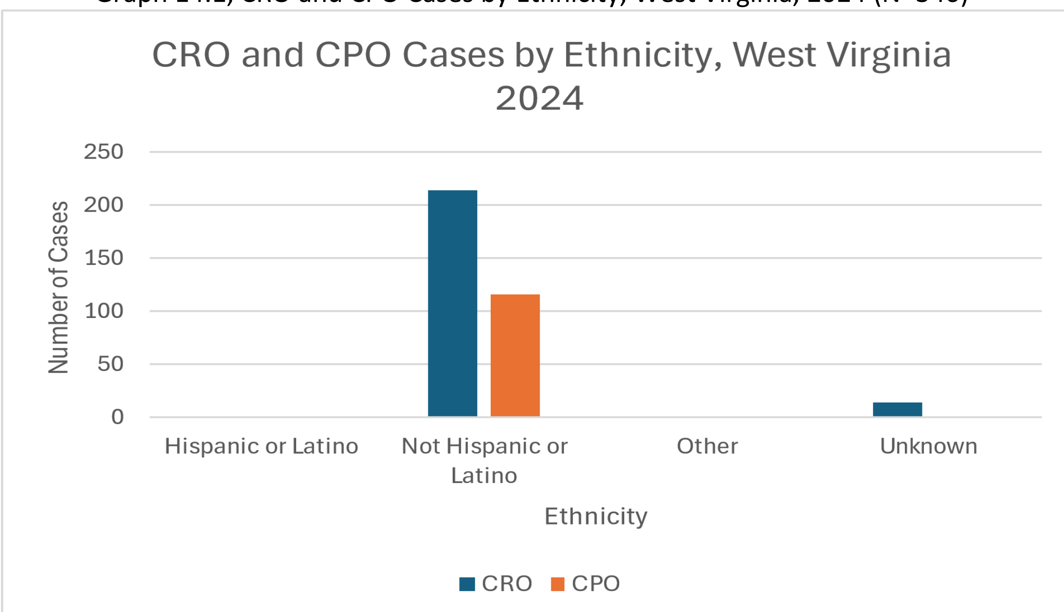


Table 14.1, Ethnicity of CRO Cases by Surveillance Region, West Virginia, 2024 (N=229)

Ethnicity	Central (n=25)	East (n=31)	MOV (n=14)	North (n=16)	Northeast (n=19)	South (n=79)	West (n=45)
Hispanic or Latino	0 (100%)	0 (100%)	0 (100%)	0 (100%)	0 (100%)	0 (100%)	0 (100%)
Not Hispanic or Latino	24 (96.0%)	31 (100%)	13 (92.9%)	16 (100%)	19 (100%)	72 (91.1%)	39 (86.7%)
Other	0 (100%)	0 (100%)	0 (100%)	0 (100%)	0 (100%)	0 (100%)	0 (100%)
Unknown	1 (4.0%)	0 (100%)	1 (7.1%)	0 (100%)	0 (100%)	7 (8.9%)	6 (13.3%)

Table 14.2, Ethnicity of CPO Cases by Surveillance Region, West Virginia, 2024 (N=117)

Ethnicity	Central (n=10)	East (n=13)	MOV (n=8)	North (n=4)	Northeast (n=11)	South (n=53)	West (n=18)
Hispanic or Latino	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%	0 (0.0%)	0 (0.0%)	0 (0.0%)
Not Hispanic or Latino	10 (100%)	13 (100%)	8 (100%)	4 (100%)	10 (90.1%)	53 (100%)	18 (100%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (9.1%)	0 (0.0%)	0 (0.0%)

C. auris Cases by Ethnicity

Graph 14.2, *C. auris* Cases by Ethnicity, West Virginia, 2024 (N=24)

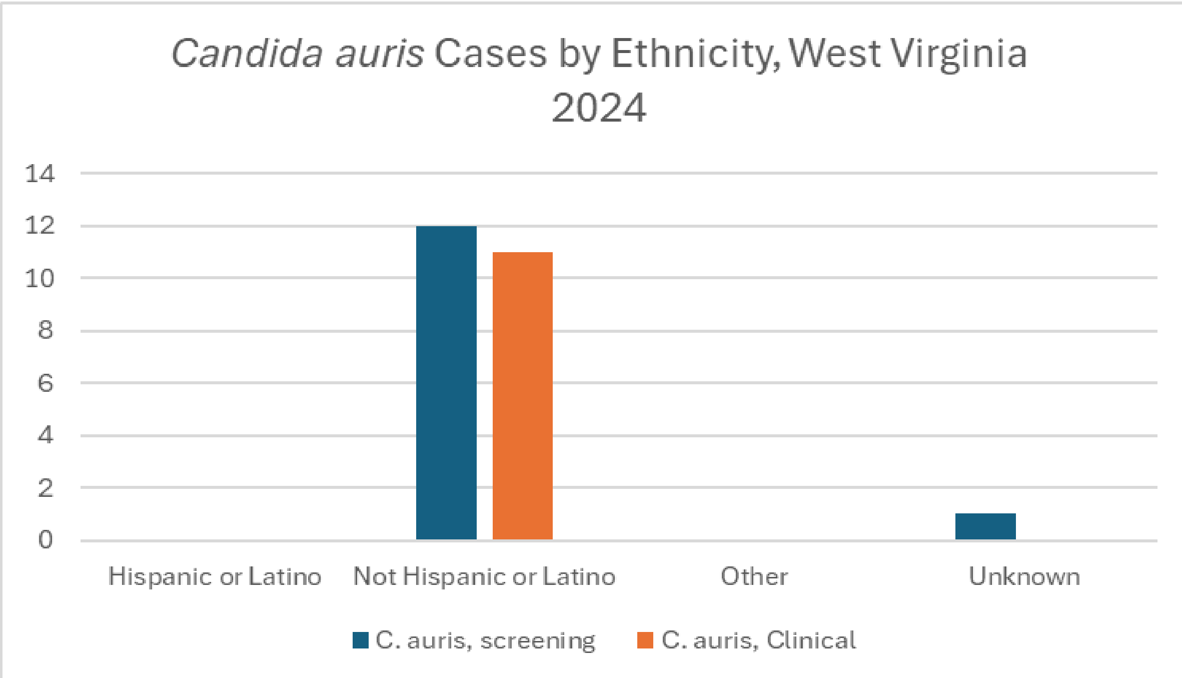


Table 14.3, Ethnicity of *C. auris* Cases by Surveillance Region, West Virginia, 2024 (N=24)

Ethnicity	***C. auris* Screening (n=13)**	***C. auris* Clinical (n=11)**
Hispanic or Latino	0 (0.0%)	0 (0.0%)
Not Hispanic or Latino	12 (92.3%)	11 (100%)
Other	0 (0.0%)	0 (0.0%)
Unknown	1 (7.7%)	0 (0.0%)

Social Vulnerability

Many factors impact a community's capacity to prepare for and respond to disease outbreaks and other public health situations, including MDRO transmission. These factors include poverty level, unemployment, level of education, presence of physical or mental disability, lack of transportation or housing, and racial and ethnic status.

According to a recent report from the West Virginia Geographic Information Systems (GIS) Technical Center, the five counties with the highest social vulnerability index (SVI) scores, in ascending order, are Webster, Clay, Mingo, Wyoming, and McDowell. The top three counties are part of the Southern Surveillance Region.

The number of MDROs in each surveillance region may or may not correlate with higher SVI scores. For example, Webster County was part of the central surveillance region in 2024 with an overall SVI score of 0.4775 (low to medium level of vulnerability) and reported only 23 CROs. In the Western region, Mingo County has six CROs and no CPOs. *C. auris* cases (clinical and screening) were most frequently reported in the Northern and Central regions, both of which also had overall SVI scores in the low-to-medium range. By contrast, the Southern region—home to two of the five most socially vulnerable counties—had the highest overall SVI in the state at 0.6033, reflecting a medium-to-high vulnerability risk.

Of West Virginia’s 1.74 million residents, an estimated 292,000 (16.8%) live below the federal poverty level (FPL), compared to a national average of 12.5%. In 2024, the FPL in West Virginia was $15,060 annually for a single-person household and $31,200 annually for a family of four. West Virginia consistently ranks among the poorest states in the nation, and McDowell County is regularly among the top five counties nationwide with the highest poverty rates. Poverty directly impacts healthcare access, often leading to delayed care, reduced preventive services, and higher financial barriers to treatment due to limited or absent insurance coverage.

Further research is needed to determine whether a direct relationship exists between social vulnerability and antimicrobial-resistant infections in West Virginia. The growing use of SVI metrics provides an opportunity to design public health interventions that are tailored to specific community needs.

Discussion

The spread of MDRO infections remains an urgent public health threat. While a significant proportion of the burden falls on the southern region of the state, healthcare facilities across all regions must remain vigilant, as no facility is unaffected.

This data should be interpreted with caution. West Virginia conducts passive surveillance, relying on laboratories and healthcare facilities to report cases. Although MDROs are reportable conditions, underreporting may occur. In addition, available data reflect only patient status at the time of specimen collection, making it difficult to determine the true cause of hospitalization or the broader clinical impact.

Another key limitation is assessing the population at risk. While some MDRO infections may originate in the community, most have historically been associated with healthcare exposure and prolonged use of broad-spectrum antibiotics. Because hospital populations are dynamic, determining the precise population at risk remains a challenge.

Recommendations

Despite these limitations, the findings of this report have important implications for infection prevention and control. Healthcare facilities across West Virginia should:

- Adhere to infection prevention measures: Implement standard and contact precautions, or enhanced barrier precautions (EBP) in nursing homes, for patients infected or colonized with MDROs.

- Strengthen antimicrobial stewardship programs: Incorporate evidence-based prescribing practices and ensure facility-wide adoption of CDC's Core Elements of Antimicrobial Stewardship, tailored to the facility type.

- Invest in education and awareness: Continue educating providers, patients, and the public on the risks of antimicrobial overuse and misuse.

Facilities that need assistance developing or strengthening infection prevention programs can request support from the West Virginia Office of Epidemiology and Prevention Services (OEPS) Healthcare-Associated Infections / Antimicrobial Resistance (HAI/AR) program. Resources include:

- Infection Control Assessment and Response (ICAR) team: Provides guidance to healthcare facilities in identifying gaps in infection control and improving patient safety.

- WV Project Firstline: Offers innovative and accessible infection control training for frontline healthcare workers to strengthen preparedness against infectious disease threats.

Summary

MDRO infections continue to pose serious public health concern in West Virginia. High rates of risk factors increased antimicrobial use and misuse, and the difficulty of treating resistant organisms highlight the need for robust surveillance and prevention. Collaborative action between healthcare facilities and public health partners is essential to reduce transmission and protect the health and well-being of West Virginians.