

## Community-wide Surveillance for Carbapenemase Producing Organisms (CPO) Statistical Report for 2024 Quarter 3

Division of Epidemiology & Public Health Preparedness (EPHP) 775-328-2447

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### Cumulative Summary & Changes from Previous Quarter \*

- CRO counts: 54 (increased by 20)
- CPO counts: 5 (increased by 4)
- CRO antibiotic resistance:
  - 3+ classes of antibiotics: 68.5% (decreased by 2.1%)
  - 4+ classes of antibiotics: 57.4% (increased by 1.5%)
  - Pan resistance: 0 (no change)

Please note caution should be taken when comparing 2023 and onward data to previous years as case definition changes have affected case counts.

\*For definition and specifics on metrics summarized, please refer to corresponding sections and the surveillance definitions at the end.

### CRO Overview

Table 1: CRO cases reported by quarter, Washoe County, 2024

CRO Type	Q1	Q2	Q3	Q4	Total
CRE	6	10	5	-	21
CRPA	6	11	14	-	31
CRAB	0	1	0	-	1
Unk*	0	0	1	-	1
Other CROs	0	0	0	-	0
<b>Total</b>	<b>12</b>	<b>22</b>	<b>20</b>	<b>-</b>	<b>54</b>

\* Unknown organism was detected via PCR screening swab that indicated the presence of a CRO, but failed to culture.

- For the current reporting quarter, 20 CROs were reported.
  - 5 CRE, 14 CRPA, 1 CRAB, and 1 unknow CRO.

**Table 1-1: Descriptive statistics for reported CRO cases, Washoe County, 2024**

Characteristics		2024	
		No.	Percent (%)
<b>Age</b>	Median	69 years	NA
	Minimum	21 years	NA
	Maximum	91 years	NA
<b>Gender</b>	Male	25	46.30%
	Female	29	53.70%
<b>Race/Ethnicity</b>	White, non-Hispanic	28	51.85%
	White, Hispanic	3	5.56%
	Asian	1	1.85%
	Black	0	0.00%
	American Indian/Alaskan Native	0	0.00%
	Other	2	3.70%
	Unknown	0	0.00%
<b>Washoe County Resident</b>	Yes	44	81.48%
	No	10	18.52%
	Unknown	0	0.00%
<b>Specimen Type</b>	Urine	36	66.67%
	Respiratory	4	7.41%
	Wound	7	12.96%
	Rectal	1	1.85%
	Invasive (e.g., blood, cerebrospinal fluid)	2	3.70%
	Other	2	3.70%
	Surgical	1	1.85%
Unknown	1	1.85%	
<b>Facility Type</b>	Inpatient	13	24.07%
	Outpatient	30	55.56%
	Long Term Acute Care	2	3.70%
	Intensive Care Unit	8	14.81%
	Skilled Nursing Facility	1	1.85%
<b>Total</b>		54	100.00

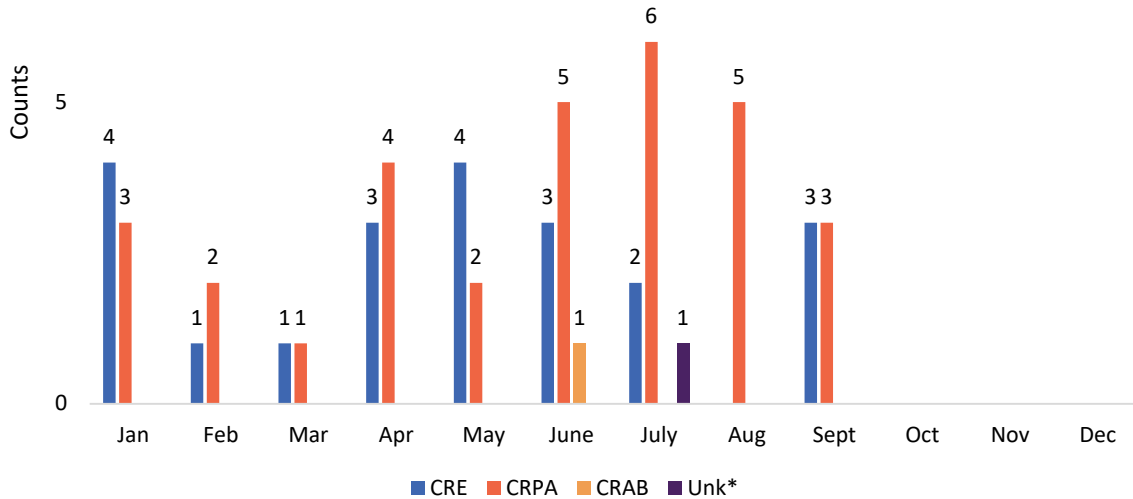
In summary, 2024 CRO cases were:

- 69 years (median age).
- Female (53.70%).
- White, non-Hispanic (51.85%).
- Washoe County residents (81.48%).
- Detected from urine specimens (66.67%), and at an outpatient facility (55.56%).

Data presented in this report is preliminary and may be updated in future reports as additional information is received throughout the year.

**Figure 1: CRO cases reported by month, Washoe County, 2024**

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\* Unknown organism was detected via PCR screening swab that indicated the presence of a CRO, but failed to culture.

- CRE cases (blue) peaked in January and May (4 cases each) and were the lowest in February and March (1 case each). CRE cases remained relatively high in the 2<sup>nd</sup> quarter compared to the 1<sup>st</sup> and 3<sup>rd</sup>.
- CRPA cases (orange) peaked in July (6 cases) and were the lowest in March (1 case). CRPA cases continued to increase between quarter 2 and 3.
- One CRAB (gold) case was reported.

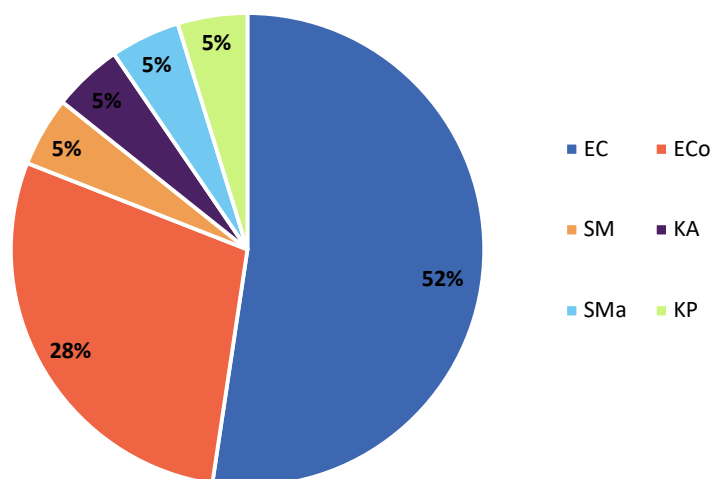
**Table 2: Proportion of CROs that were CREs, Washoe County, 2020-2024**

Year	CRO Total	CRE Total	Proportion (%)
2020	90	48	53.33
2021	77	36	46.75
2022	145	62	42.76
2023	81	42	51.85
2024	54	21	38.89

- Of the 54 CRO's reported, 38.89% (21/54) were CREs.

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Figure 2: CRE cases reported by organism (N=21), Washoe County, 2024



EC-*Enterobacter cloacae*, ECo-*Escherichia coli*, SM-*Serratia marcescens*, KA-*Klebsiella aerogenes*, SMa-*Stenotrophomona maltophilia*, KP-*Klebsiella pneumoniae*

Of the 21 CREs reported,

- *Enterobacter cloacae* was the most reported (57%).
- *Serratia marcescens*, *Klebsiella aerogenes*, and *Stenotrophomona maltophilia* were the least reported (6% each).

## Carbapenemase Producing Organisms (CPO)

Table 3: CPO cases reported, Washoe County, 2024

Month/Year Reported	Resistance Mechanism	Organism	Clinical, Screening	Case notes
4/2024	NDM	<i>Escherichia coli</i>	Clinical	UTI symptoms. Received treatment in a South American clinic for traveler's diarrhea prior to symptom onset but was not hospitalized. No contacts identified.
7/2024	NDM	<i>Klebsiella pneumoniae</i>	Clinical	Severe wound infection at a hip replacement site performed in El Salvador. Broader screening didn't find spread in the acute care hospital. Case was discharged to a SNF. Screening identified the presence of OXA-48, but failed to culture an organism.
	OXA-48	Unknown	Screening	

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<b>8/2024</b>	NDM	<i>Escherichia coli</i>	Clinical	Experienced UTI symptoms after having a catheter inserted at an outpatient facility.
<b>10/2024</b>	NDM	<i>Escherichia coli</i>	Clinical	Hospitalized and intubated in Mexico after experiencing respiratory failure. Transferred to a health facility in California before being transferred to a Washoe County health facility where he continued to experience respiratory issues.

- Three NDM producing *Escherichia coli* (*E. coli*) have been reported.
- One NDM producing *Klebsiella pneumoniae* has been reported.
- One OXA-48 resistance mechanism from an unknown organism was reported.

Tables 4 and 5 and Figures 3 and 4 present laboratory test data used to identify CPOs. The modified carbapenem inactivation method (mCIM) is a phenotypic (observable trait) test, while polymerase chain reaction (PCR) is a molecular test for carbapenemase genes. Please note the following when interpreting the data:

- Not all specimens are forwarded to the Nevada State Public Health Laboratory for mCIM testing.
- Some area hospitals perform PCR testing in-house.
- Though mCIM and PCR positive counts often match, in some instances, a specimen may only test positive for one of either tests.

**Table 4: Modified carbapenem inactivation method (mCIM) testing, Washoe County, 2020-2024**

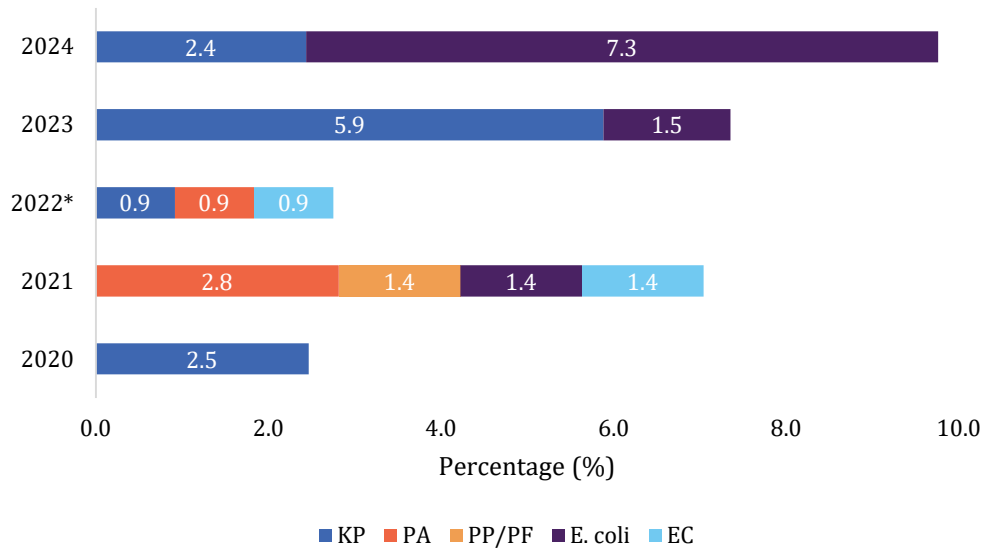
Year	N Tested	N Positive	Positivity (%)
<b>2020</b>	81	5	6.17
<b>2021</b>	71	5	7.04
<b>2022*</b>	109	3	2.75
<b>2023</b>	68	2	2.94
<b>2024*</b>	41	4	9.76
<b>Total</b>	370	19	5.14

\* One CPO is not included in Table 4 as they were identified by PCR testing and were not mCIM tested.

- Out of the 41 specimens submitted for mCIM testing, four specimen was positive (9.76%).

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**Figure 3: Percent mCIM positive by organism, Washoe County, 2020-2024**



KP-*Klebsiella pneumoniae*, PA-*Pseudomonas aeruginosa*, PP/PF-*Pseudomonas putida/fluorescens*, EC-*Enterobacter cloacae*

- Of the organisms that were mCIM positive in 2024, 7.3% were *E. coli* and 2.4% were *Klebsiella pneumoniae*.
- From 2020-2023, the organisms that were mCIM positive varied.

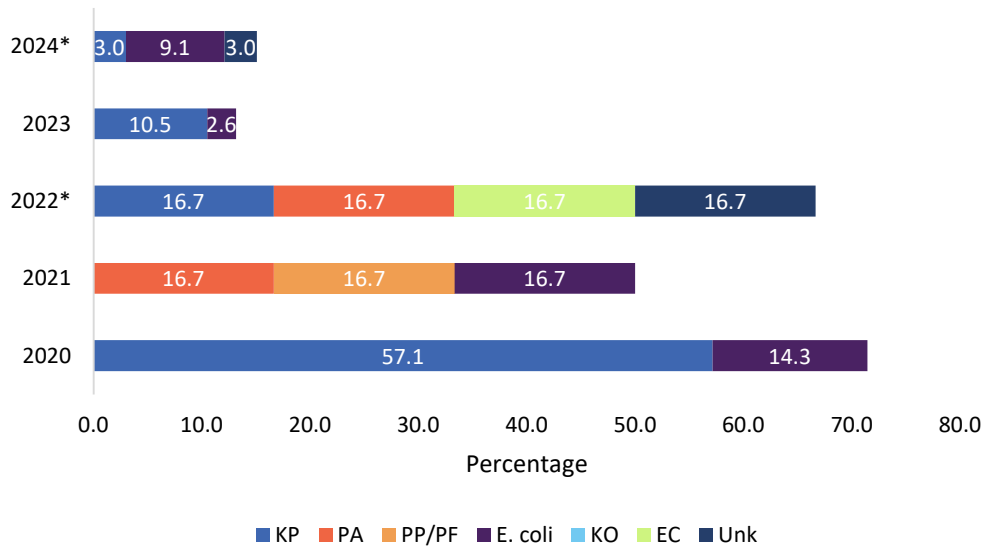
**Table 5: Polymerase chain reaction (PCR) testing, Washoe County, 2020-2024**

Year	N Tested	N Positive	Positivity (%)
2020	7	5	71.4
2021	6	3	50.0
2022	6	4	66.7
2023	38	5	13.2
2024	33	5	15.2
<b>Total</b>	90	22	24.4

- Out of the 33 specimens submitted for PCR testing in 2024, five were positive (15.2%).

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**Figure 4: Percent PCR positive by organism, Washoe County, 2020-2024**



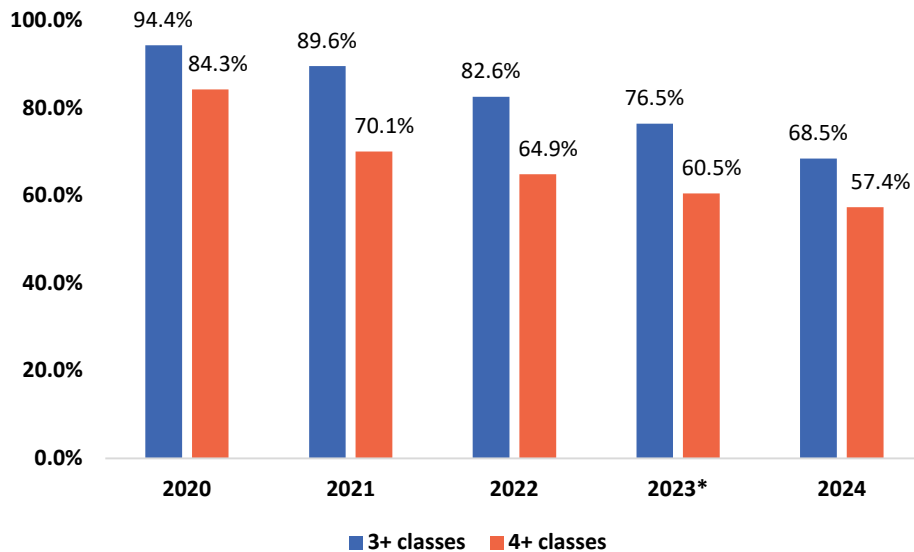
KP-*Klebsiella pneumoniae*, PA-*Pseudomonas aeruginosa*, PP/PR-*Pseudomonas fluorescens/putida*, EC-*Enterobacter cloacae*, KO-*Klebsiella oxytoca*

\*1 screening specimen was PCR positive, but failed to culture an organism.

- Of the organisms that were PCR positive in 2024, 9.1% were *E. coli*, 3.0% were *Klebsiella pneumoniae*, and 3.0% were an unknown organism.
- From 2020-2023, the organisms that were PCR testing varied, however, *Klebsiella pneumoniae* was the highest across all years combined.

## Severity of Antibiotic Resistance

**Figure 5: Percent of CRO cases resistant to classes of antibiotics, Washoe County, 2024**



\* Caution should be taken when comparing 2023 data to previous year as case definition change affected case counts.

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In 2024, the proportion of reported CROs resistant to at least

- three or more classes of antibiotics was 68.5% (37/54).
- four or more classes of antibiotics was 55.9% (31/54).
- Between 2020-2023, antibiotic resistance had a downward trend.

**Table 6: Pan-resistance rate, Washoe County, 2020-2024**

Year	Total N Cases	No. Pan-resistance	Proportion (%)	Organisms (No. pan-resistant)
2020	89	2	2.25	<i>Citrobacter sp.</i> (1), <i>K. pneumoniae</i> (1)
2021	76	0	0.00	-
2022	145	1	0.69	<i>Pseudomonas aeruginosa</i>
2023	81	1	1.23	<i>Acinetobacter baumannii</i>
2024	54	0	0.00	-

Proportion pan-resistant\*: 0% (0/54).

\*Pan-resistance is defined as non-susceptible to all tested drugs at the clinical lab.



**Table 7. Antibiotic Susceptibility for CRE, CRPA and CRAB 2024**

Antimicrobial Class or Subclass	CRE (n=21)			CRPA <sup>1</sup> (n=31)			CRAB <sup>1</sup> (n=1)		
	# Tested	# Susceptible	% Susceptible	# Tested	# Susceptible	% Susceptible	# Tested	# Susceptible	% Susceptible
<b>Penicillins</b>									
Ampicillin	24	0	0.00	28	0	0.00			
Piperacillin				5	3	60.00			
<b>Cephems</b>									
Cefazolin	32	1	3.13	3	0	0.00			
Cefepime	32	12	37.50	54	40	74.07	2	1	50.00
Cefotaxime	1	0	0.00						
Ceftazidime	18	2	11.11	35	21	60.00	1	0	0.00
Ceftriaxone	29	1	3.45	3	0	0.00	1	0	0.00
Cefuroxime	17	1	5.88						
<b>β-Lactam/β-lactamase inhibitor combinations</b>									
Amoxicillin-clavulanic acid	19	0	0.00						
Ampicillin-sulbactam	27	0	0.00	28	0	0.00	2	1	50.00
Piperacillin-tazobactam	29	3	10.34	51	32	62.75			
Ticarcillin-clavulanic acid				2	1	0.50			
<b>Fluoroquinolones</b>									
Ciprofloxacin	32	21	65.63	56	25	44.64	2	1	50.00

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Antimicrobial Class or Subclass (cont'd)	CRE (n=16)			CRPA <sup>1</sup> (n=17)			CRAB <sup>1</sup> (n=1)		
	# Tested	# Susceptible	% Susceptible	# Tested	# Susceptible	% Susceptible	# Tested	# Susceptible	% Susceptible
Levofloxacin	34	22	64.71	34	13	38.24	2	1	50.00
Moxifloxacin	4	3	75.00						
<b>Aminoglycosides</b>									
Amikacin	17	16	94.12	49	49	100.00	1	1	100.00
Gentamicin	33	29	87.88	44	32	72.73	2	2	100.00
Tobramycin	33	28	84.85	41	38	92.68	1	1	100.00
<b>Sulfonamides</b>									
Trimethoprim-sulfamethoxazole	33	24	72.73	3	0	0.00	2	1	50.00
<b>Monobactams</b>									
Aztreonam	14	1	7.14	33	20	60.61			
<b>Tetracyclines</b>									
Tetracycline	21	15	71.43	3	0	0.00			
Tigecycline	11	11	100.00						
<b>Nitrofurans</b>									
Nitrofurantoin	15	9	60.00	3	1	33.33			
<b>Carbapenems</b>									
Imipenem	7	3	42.86	25	0	0.00			
Meropenem	28	15	53.57	57	22	38.60	2	1	50.00
Ertapenem	29	2	6.90	4	0	0.00			

\* 1 Pseudomonas aeruginosa and Acinetobacter have intrinsic resistance to Ertapenem.

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## Surveillance Definitions (Years Updated)

### Report Date (2024)

For this report, the date of specimen collection is used for case counts by months.

### Carbapenemase-Producing Organisms (CPO) (2023)

Any specimen that meets confirmatory laboratory evidence:

- Positive phenotypic test for carbapenemase production **OR**
- Molecular test detecting a carbapenemase gene **OR**
- Next generation sequencing detecting a carbapenemase gene.

CPO cases will be classified as either clinical case (collected for diagnosing/treating disease), or as screening case (collected for detecting colonization), however since reason for collecting specimens is not reported, the specimen site denotes CPO case classification. Typically a CPO identified through a rectal, peri-rectal, axilla, groin, or stool specimen would be considered screening.

### Duplicates (2023)

Duplicates are defined as the same organism/carbapenemase combination regardless of collection source and date. A screening case can be counted as a new clinical case if, for example, they developed a blood stream infection, found to be due to the same organism/carbapenemase combination, but a clinical case cannot be counted as a new screening case with same organism/carbapenemase combination.

### Carbapenem Resistant *Enterobacteriaceae* (CRE) (2022)

*Enterobacteriaceae* that meets the following criteria:

- Resistant to ANY carbapenem antimicrobial (i.e., MIC of  $\geq 4$  mcg/ml for doripenem, meropenem, or imipenem **OR**  $\geq 2$  mcg/ml for ertapenem) **OR**
- Documented to produce carbapenemase

In addition:

- For bacteria that have intrinsic imipenem nonsusceptibility (i.e., *Morganella morganii*, *Proteus spp.*, *Providencia spp.*), resistant to carbapenems other than imipenem is required.

### Carbapenem Resistant *Pseudomonas aeruginosa* (CRPA) (2022)

*Pseudomonas aeruginosa* isolated from any body site\* that meets the following criteria:

- Resistant to imipenem, meropenem, or doripenem based on current Clinical and Laboratory Standards Institutes Standards (CLSI) M100 standards ( $\geq 8$  mcg/mL); **AND/OR**

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- Demonstrates production of a carbapenemase by a recognized method (e.g., CarbaNP or Polymerase chain reaction (PCR) or other methods).

*\*Excluding isolates from patients with cystic fibrosis (CF).*

### **Carbapenem Resistant *Acinetobacter* (CRA) (2022)**

*Acinetobacter* isolated from any body site that meets the following criteria:

- Resistant to imipenem, meropenem, or doripenem based on current Clinical and Laboratory Standards Institutes Standards (CLSI) M100 standards ( $\geq 8$  mcg/mL);  
**AND/OR**
- Demonstrates production of a carbapenemase by a recognized method (e.g., CarbaNP or PCR or other methods).

### **Carbapenem Resistant Organisms (CRO) (2017)**

Any organisms meeting the above definitions for CRE, CRPA, and CRA are considered CRO.

### **Carbapenemase Producing Organisms (CPO) (2017)**

Any organisms producing carbapenemase which is laboratory-confirmed are defined as CPO.

### **Multi-Drug Resistant Bacilli – Carbapenem Resistant (MDRB-CR) (2010-2016)**

A case is defined as an infection with an MDRB-CR organism of one patient per hospitalization per year regardless of resident status. Infection with a second species of MDRB-CR organism in the same patient is counted as a separate case. Infections with those Gram-negative bacilli that are constitutively resistant to carbapenems, specifically *Stenotrophomonas*, *Aeromonas* & *Chryseobacterium*, are not counted as cases.

MDRB-CR organisms refer to Gram negative bacilli that are resistant to three or more classes of antibiotics, one of which must be Carbapenem.

### **Patient's Residency (SINCE 2010)**

Patients from out of jurisdiction (OOJ) are included in the surveillance report as long as isolates meet the above surveillance definitions.