



**Laboratory Reporting for:
Carbapenem-Resistant Enterobacteriaceae
(CRE) and *Acinetobacter baumannii* (CRAB)**

Healthcare Associated Infections & Antimicrobial Resistance
(HAI-AR) Program

Connecticut Department of Public Health

Version	Authors	Date of Changes
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ABBREVIATIONS & ACRONYMS

AMR: Antimicrobial resistance

AST: Antimicrobial Susceptibility Testing

BAL: Bronchoalveolar lavage

CDC: Centers for Disease Control and Prevention

CP: Carbapenemase-producing

CRAB: Carbapenem-resistant *Acinetobacter baumannii*

CRE: Carbapenem-resistant Enterobacteriaceae

HAI: Healthcare-Associated Infection

PCR: Polymerase chain reaction

SPHL: State Public Health Laboratory

CRE (Carbapenem-resistant Enterobacteriaceae) is an emerging cause of HAI that poses a significant threat to public health. These bacteria are difficult to treat due to increased levels of antibiotic resistance. CREs are reportable and associated with high mortality. These superbugs are detected by culture, and susceptibility testing determines if they are CRE. PCR tests can also detect CRE.

When to report CRE results: Please send lab report (electronic or OL15c) to DPH and submit bacterial isolate to SPHL when an isolate is **first identified with any MIC or zone criteria that indicates possible CRE**, even if this has not yet been confirmed by additional testing.

Laboratory criteria for CRE reporting:

- Enterobacteriaceae species***, if the specimen is collected from urine, a respiratory source, blood, or other normally sterile site

AND

- Isolate is resistant[†] to any carbapenem** (Doripenem, Imipenem, Meropenem, or Ertapenem)

Note: Report based on MIC and Zone Diameter, not on interpretation alone. Please refer to Table.

Note: **All *Proteus*, *Morganella*, and *Providencia*** are resistant to imipenem, so resistance to imipenem only for these genera does not require reporting.

OR

The organism displays production of carbapenemase (e.g. KPC, NDM, VIM, IMP, and OXA-48) by PCR regardless of susceptibility results.

Enterobacteriaceae genera** (common ones bolded): ***Citrobacter*, *Enterobacter*, *Hafnia*, *Klebsiella*, *Morganella*, *Proteus*, *Providencia*, *Salmonella*, *Serratia*, *Shigella*, *Yersinia, *Alterococcus*, *Arsenophonus*, *Brenneria*, *Buchnera*, *Budvicia*, *Buttiauxella*, *Calymmatobacterium*, *Candidatus Phlomoacter*, *Cedecea*, *Edwardsiella*, *Erwinia*, *Ewingella*, *Kluyvera*, *Leclercia*, *Leminorella*, *Moellerella*, *Obesumbacterium*, *Pantoea*, *Pectobacterium*, *Photorhabdus*, *Plesiomonas*, *Pragia*, *Rahnella*, *Raoultella*, *Saccharobacter*, *Sodalis*, *Tatumella*, *Tralbulsiella*, *Wigglesworthia*, *Xenorhabdus*, *Yokenella*

†Table. MIC and Zone Diameter Interpretive Criteria for *E. Coli*, *Klebseilla* species, and *Enterobacter* species by antimicrobial, based on [2018 CLSI breakpoints \(M100-S28\)](#)

MIC Criteria (µg/mL)				Zone Diameter Criteria (nearest whole mm)			
Doripenem	Imipenem	Meropenem	Ertapenem	Doripenem	Imipenem	Meropenem	Ertapenem
≥4	≥4	≥4	≥2	≤19	≤19	≤19	≤18

Note: If breakpoints above are not in use at your facility, please contact DPH for individualized guidance.

Lab Testing Data Elements to report for CRE:

- Patient and Provider information
- CRE culture results
 - o Genus and species of organism (e.g. *Klebsiella pneumoniae*)
 - o Specimen source (e.g. urine, sputum, BAL, pleural fluid, blood, abscess, CSF, etc.)
 - o Body site (e.g. peripheral blood, groin, left great toe, etc.)
 - o Date of collection
- Susceptibility results
 - o For each drug: MIC value (when available), zone diameter (when available), and interpretation
 - o Methodology (e.g. Vitek, Phoenix, Microscan, Sensititre, Kirby-Bauer, E-test)
- PCR results for carbapenemase (when available)
 - o Positive carbapenemase findings
 - o Negative results of carbapenemases tested

CRAB (Carbapenem-resistant *Acinetobacter baumannii*) is an important pathogen causing healthcare-associated infections (HAIs) and frequently responsible for outbreaks in healthcare facilities. Spread of *A. baumannii* infection is difficult to control because *Acinetobacter* can survive for prolonged periods on environmental surfaces.

When to report CRAB results: Please send lab report (electronic or OL15c) to DPH and submit bacterial isolate to SPHL when an isolate is **first identified with any MIC or zone criteria that indicates possible CRAB**, even if this has not yet been confirmed by additional testing.

Laboratory criteria for CRAB reporting:

1. **Acinetobacter species***, if the specimen is collected from urine, a respiratory source, a wound, blood, or other normally sterile site

AND

2. **Isolate is resistant[†] to any carbapenem except Ertapenem** (Doripenem, Imipenem, and Meropenem)

Note: Report based on MIC and Zone Diameter, not on interpretation alone. Please refer to Table.

Note: All *Acinetobacter* are resistant to Ertapenem, so *Acinetobacter* resistant to ertapenem only does not require reporting

OR

The organism displays production of carbapenemase (e.g. KPC, NDM, VIM, IMP, and OXA-48) by PCR regardless of susceptibility results.

***Include *A. baumannii*, *A. baumannii* complex, *A. calcoaceticus-baumannii* complex, and all subspecies (e.g. *Acinetobacter pittii*, *Acinetobacter nosocomialis*, *Acinetobacter calcoaceticus*)**

†Table. MIC and Zone Diameter Interpretive Criteria for *Acinetobacter baumannii* by antimicrobial, based on CDC [Multi-site Gram Negative Surveillance Initiative](#)

MIC Criteria (µg/mL)			Zone Diameter Criteria (nearest whole mm)		
Doripenem	Imipenem	Meropenem	Doripenem	Imipenem	Meropenem
>1	≥8	≥8	...	≤18	≤14

Note: Breakpoints for doripenem established by FDA. Note that these may not align with CLSI breakpoints. If breakpoints above are not in use at your facility, please contact DPH for individualized guidance.

Lab Testing Data Elements to report for CRAB:

- Patient and Provider information
- CRAB culture results
 - o Genus and species of organism (e.g. *Acinetobacter baumannii*)
 - o Specimen sources (e.g. urine, sputum, wound, BAL, pleural fluid, blood, abscess, CSF, etc.)
 - o Body site (e.g. peripheral blood, groin, left great toe, etc.)
 - o Date of collection
- Susceptibility results
 - o For each drug: MIC value (when available), zone diameter (when available), interpretation
 - o Methodology (e.g. Phoenix, Microscan, Vitek, Kirby-Bauer, E-test)
- PCR results for carbapenemase (when available)
 - o Positive carbapenemase findings
 - o Negative results of carbapenemases tested