



Allegheny County Health Department Guidelines for Prevention and Control of Carbapenem-Resistant Enterobacteriaceae (CRE)

**Allegheny County Health Department
Office of Epidemiology and Biostatistics
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These guidelines are a summary of the 2012 CRE Toolkit published by the Centers for Disease Control and Prevention (CDC) entitled “Guidance of Control of Carbapenem-resistant Enterobacteriaceae (CRE).” Much of this material is taken directly from the CDC Toolkit. This summary is intended as an easy-to-use guide for hospitals and long-term care facilities before and after identification of CRE. For more information, call the Allegheny County Health Department at (412) 687-2243.

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BACKGROUND

Enterobacteriaceae bacteria commonly affect the gastrointestinal tract. CRE are gram-negative bacteria that are resistant to carbapenem antibiotics, which are generally the last line of antibiotics to treat Enterobacteriaceae infections. If Enterobacteriaceae are resistant to carbapenems, treatment options are limited for these severe infections. Some studies indicate that CRE infections have mortality rates of up to 50%. *Klebsiella pneumoniae* carbapenemase (KPC)-producing Enterobacteriaceae are the most common CRE. Other notable CRE include New Delhi metallo- β -lactamase (NDM), Verona integron-encoded metallo β -lactamase (VIM), and imipenemase (IMP) metallo- β -lactamase.

The prevalence of carbapenem resistance among Enterobacteriaceae has been increasing since first reported in 2001. By 2012, 4% of short stay hospitals and 18% of long-term acute care hospitals reported at least one CRE case (MMWR 2013; 62:165-170). As CRE has increased in prevalence nationwide, the CDC has urged health departments to make hospitals and nursing homes aware of methods for prevention and control of CRE in healthcare settings.

CDC defines CRE as Enterobacteriaceae isolates that are:

- 1) Nonsusceptible to one of the following carbapenem antibiotics: doripenem (Doribax), meropenem (Merrem), imipenem (Primaxin) **AND**
- 2) Resistant to the following 3rd generation cephalosporins: ceftriaxone, cefotaxime, and ceftazidime.

A CRE case-patient is classified as acutely infected if the patient is experiencing symptoms (i.e. diarrhea) when a positive lab specimen is collected but considered colonized if no symptoms are present when positive specimen is taken.

The definition of CRE is complicated by the change in the Clinical Laboratory Standards Institute (CLSI) minimum inhibitory concentration (MIC) breakpoints. These new MIC breakpoints are lower than the previous breakpoints, thus CRE are detected more often using these new breakpoints compared with the old breakpoints. Unfortunately, these new MIC breakpoints are not yet FDA approved, so some laboratories are still following the old standards. The CDC and the Allegheny Health Department recommend laboratories use the 2012 CLSI MIC breakpoints for consistency across all Allegheny County healthcare facilities. The following table describes the change in MIC breakpoints as defined by CLSI:

Agent	Previous Breakpoints (M100-S19) MIC ($\mu\text{g}/\text{mL}$)			Current Breakpoints (M100-S22) MIC ($\mu\text{g}/\text{mL}$)		
	Susceptible	Intermediate	Resistant	Susceptible	Intermediate	Resistant
Doripenem	-	-	-	≤ 1	2	≥ 4
Ertapenem	≤ 2	4	≥ 8	≤ 0.5	1	≥ 2
Imipenem	≤ 4	8	≥ 16	≤ 1	2	≥ 4
Meropenem	≤ 4	8	≥ 16	≤ 1	2	≥ 4

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WHAT TO DO NOW

- Determine the CRE definition used by your facility's lab(s) and determine the carbapenem MIC breakpoints used by your facility's lab(s). If necessary, contact your lab to determine this information.
- If your facility is unaware of any previous CRE cases, review microbiology lab data from the previous 12 months to ensure no CRE cases were overlooked. Consider a point prevalence survey of high risk units to clarify CRE prevalence.
- Develop a facility specific CRE infection control policy based on CDC's CRE Toolkit
- Educate staff on CRE prevention and control.
- Establish a laboratory alert system to enable laboratory staff to quickly alert appropriate personnel (i.e. infection preventionist, patient's clinical care team) when CRE identified.
- Establish an antimicrobial stewardship program. More information on antimicrobial stewardship programs can be found here:
<http://www.cdc.gov/getsmart/index.html>
<http://www.cdc.gov/vitalsigns/antibiotic-prescribing-practices/>

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CDC CORE PREVENTION MEASURES FOR ALL FACILITIES

- Hand hygiene
 - Review proper technique with staff
 - Ensure access to well-stocked hand hygiene stations
 - Monitor all staff for adherence and report adherence rates to staff
- Contact precautions
 - Place all CRE-colonized or infected patients on Contact Precautions
 - Ensure all necessary personal protection equipment (PPE) are available to staff outside the room
 - Wash hands before donning a gown and gloves
 - Don gown and gloves before entering the affected patient's room
 - Remove gown and gloves and wash hands before exiting room
 - Monitor compliance of staff with Contact Precautions
- Healthcare personnel education
 - Conduct education sessions annually and with new staff
 - Address CRE specifically; review Contact Precautions and hand hygiene
- Patient and staff cohorting
 - House colonized or infected patients in single rooms or cohort together
 - Assign dedicated staff to care for CRE patients
- Laboratory notification
 - Facilitate rapid notification of clinical staff and infection preventionists when CRE is identified in the lab
- Use of devices
 - Minimize use of devices such as urinary catheters, endotracheal tubes, and central venous catheters
- Antimicrobial Stewardship
 - Stop any unnecessary antibiotic use to decrease the likelihood of microbial resistance
 - Restrict use of carbapenems
- CRE Screening
 - Institute screening (with stool, rectal, or peri-rectal cultures) of roommates and those sharing health care providers if a facility is known to have multiple CRE infections

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IF A SINGLE COLONIZED OR INFECTED PATIENT IS IDENTIFIED

- Notify clinical staff and infection prevention staff
- Notify patient and patient's family
- Place patient on Contact Precautions in a single room (if available)
- Review prevention of CRE transmission with staff and monitor hand hygiene and use of Contact Precautions
- Avoid sharing equipment between CRE patients and non-infected patients
- Clean patient's room daily with EPA-approved disinfectants, especially high-touch surfaces
- Screen epidemiologically-linked patients (roommates) for CRE with stool, rectal, or peri-rectal cultures (consider use of Contact Precautions for these patients until results available)
- If patient transferred within facility, ensure precautions are continued
- If a patient is transferred to another facility, complete the Inter-facility Infection Control Transfer Form (attached)

IF MORE THAN ONE COLONIZED OR INFECTED PATIENT IS IDENTIFIED

- Follow all steps above
- Notify the Allegheny County Health Department
- Cohort patients and staff
- Conduct additional active surveillance: culture all contacts or certain high risk groups such as those admitted from known CRE facilities or those admitted to the ICU
- Consider bathing patients with chlorhexidine (2%)
- Review effectiveness of control measures with infection control and clinical staff to identify potential areas of improvement

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RESOURCES

CDC 2012 CRE Toolkit: Guidance for Control of Carbapenem-Resistant Enterobacteriaceae (CRE). Available at: <http://www.cdc.gov/hai/organisms/cre/cre-toolkit/index.html>

OHA 2013 Toolkit: Guidance for Control of Carbapenem-Resistant Enterobacteriaceae (CRE). Available at: http://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/CRE/Documents/cre_toolkit.pdf

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Inter-facility Infection Control Transfer Form

This form must be filled out for transfer to accepting facility with information communicated prior to or with transfer
Please attach copies of latest culture reports with susceptibilities if available

Sending Healthcare Facility:

Patient/Resident Last Name	First Name	Date of Birth	Medical Record Number
		/ /	

Name/Address of Sending Facility	Sending Unit	Sending Facility phone

Sending Facility Contacts	NAME	PHONE	E-mail
Case Manager/Admin/SW			
Infection Prevention			

Is the patient currently in isolation? NO YES

Type of Isolation (check all that apply) Contact Droplet Airborne Other:

Does patient currently have an infection, colonization OR a history of positive culture of a multidrug-resistant organism (MDRO) or other organism of epidemiological significance?	Colonization or history Check if YES	Active infection on Treatment Check if YES
Methicillin-resistant Staphylococcus aureus (MRSA)		
Vancomycin-resistant Enterococcus (VRE)		
Clostridium difficile		
Acinetobacter, multidrug-resistant*		
E coli, Klebsiella, Proteus etc. w/Extended Spectrum B-Lactamase (ESBL)*		
Carbapenemase resistant Enterobacteriaceae (CRE)*		
Other:		

Does the patient/resident currently have any of the following?

- | | |
|---|--|
| <input type="checkbox"/> Cough or requires suctioning
<input type="checkbox"/> Diarrhea
<input type="checkbox"/> Vomiting
<input type="checkbox"/> Incontinent of urine or stool
<input type="checkbox"/> Open wounds or wounds requiring dressing change
<input type="checkbox"/> Drainage (source) _____ | <input type="checkbox"/> Central line/PICC (Approx. date inserted ___/___/___)
<input type="checkbox"/> Hemodialysis catheter
<input type="checkbox"/> Urinary catheter (Approx. date inserted ___/___/___)
<input type="checkbox"/> Suprapubic catheter
<input type="checkbox"/> Percutaneous gastrostomy tube
<input type="checkbox"/> Tracheostomy |
|---|--|

Is the patient/resident currently on antibiotics? NO YES:

Antibiotic and dose	Treatment for:	Start date	Anticipated stop date

Vaccine	Date administered (If known)	Lot and Brand (If known)	Year administered (If exact date not known)	Does Patient self report receiving vaccine?	
Influenza (seasonal)				<input type="radio"/> yes	<input type="radio"/> no
Pneumococcal				<input type="radio"/> yes	<input type="radio"/> no
Other: _____				<input type="radio"/> yes	<input type="radio"/> no

Printed Name of Person completing form	Signature	Date	If information communicated prior to transfer: Name and phone of individual at receiving facility