

Carbapenemase-Producing Organisms (CPOs)

Q1: What are carbapenemase-producing organisms (CPOs)?

A: Carbapenemase-producing organisms are **bacteria that produce enzymes that breakdown carbapenems, which render carbapenems and other beta-lactam antibiotics ineffective.**

CPOs can cause a variety of infections (e.g., wound, respiratory, bloodstream), but do not always cause clinical infections; CPOs can also colonize individuals without causing signs or symptoms. Individuals colonized with CPOs are still capable of contributing to transmission and are at risk for progression from colonization to clinical infection.

Q2: What are carbapenemase-producing resistance genes (e.g., KPC, NDM, VIM, IMP, OXA-48, OXA-58, OXA-23, OXA-24/40)?

A: Carbapenemase-producing resistance genes are **mechanisms of antimicrobial resistance that give bacteria the ability to produce enzymes that breakdown carbapenems and make an organism resistant to carbapenem antibiotics.** These particular carbapenemase-producing genes are concerning because they are located on mobile genetic elements called plasmids, which enable bacteria to share the resistance gene(s) with other organisms they come in contact with.

Example: An individual initially identified as having a KPC gene associated with *Klebsiella pneumoniae* can subsequently have other organisms, like *Escherichia coli*, detected with the KPC gene as a result of horizontal gene transfer.

Q3: If a patient has a carbapenemase-producing gene identified and is placed on Enhanced Barrier Precautions, can the patient still have a roommate?

A: Individuals placed on Enhanced Barrier Precautions can have a roommate. To the extent possible, individuals colonized or infected with CPOs should be roomed with individuals that have the same organism(s) and/or gene(s). Placement of individuals with different genes in a shared room should be avoided as much as possible since these bacteria can acquire multiple resistance genes. If there aren't any other patients/residents with the same gene(s) that the patient/resident can be roomed with, consider placing the patient/resident in a room with the lowest-risk individual, such as those without open wounds and without (or with minimal) indwelling devices.

Carbapenemase-Producing Organisms (CPOs)

Q4: If a patient has a carbapenemase-producing gene identified but does not have symptoms, are transmission-based precautions necessary?

1

A: Despite the absence of symptoms, colonized individuals can and do spread CPOs to others, to the environment, and to shared equipment and devices. **If a patient has any carbapenemase-producing gene detected, it is critical that they are placed and maintained on either Contact Precautions (in acute care settings) or Enhanced Barrier Precautions (in long-term care settings when Contact Precautions are not indicated) for all healthcare admissions.**

It is important to remember that all individuals colonized with CPOs are at a higher risk for progression to clinical infection. This makes strict adherence to infection prevention and control measures (e.g., hand hygiene, transmission-based precautions and appropriate PPE use, environmental cleaning and disinfection) important in the prevention of clinical infections among those already colonized with a CPO.

Q5: Are antibiotics responsible for the development of carbapenemase-producing genes?

A: Clinical use of antibiotics is not responsible for evolution of carbapenemases, so this resistance gene would not develop as a result of antibiotic exposure.

Q6: Do carbapenemase-producing genes go away?

A: Carbapenemase-producing resistance genes are thought to colonize an individual indefinitely, as currently available data on long-term care residents demonstrate these individuals remain colonized for years, and there are currently no effective methods of decolonization. Individuals that have been identified as positive for any of these resistance genes can fluctuate between having these genes detected and not detected in subsequent testing. As a result, once an individual is identified as positive for any of these carbapenemase-producing genes, they should always be treated as positive for all subsequent healthcare encounters/admissions and maintained on the appropriate transmission-based precautions (i.e., Contact Precautions or Enhanced Barrier Precautions).