

■ WHAT IS CRE?

CRE stands for “carbapenem-resistant *Enterobacteriaceae*”. *Enterobacteriaceae* are a family of bacteria that are typically found in people’s gastrointestinal tract, which can cause infections in the community and healthcare settings. A few bacteria in this family have become resistant to all or many of today’s antibiotics. These bacteria were once uncommon in the US before 1992, but are becoming increasing common due to the spread of *Klebsiella pneumoniae* carbapenemase also known as KPC.

■ HOW DO ENTEROBACTERIACEAE BECOME RESISTANT TO CARBAPENEMS?

Unlike other multi-drug resistant organisms (MDRO) like MRSA which only a single mechanism leads to drug resistant CRE can become drug resistant through a variety of mechanisms. Before the recent emergence of KPC a majority of CRE became resistant to carbapenems through a beta-lactamase and porin mutation which limited the carbapenems ability to get into the bacteria. KPC was first detected in the United States in 2001 and resistance spread quickly because the genes that code for KPC are highly mobile. There are other carbapenemases that can lead to carbapenem resistance, but are much more common outside of the US.

■ WHY ARE CRE EPIDEMIOLOGICALLY IMPORTANT?

1. Since CRE is resistant to many known antibiotics it considerably limits treatment options.
2. CRE infections are associated with high mortality rates, some studies have shown rates as high as 50%.
3. CRE have carbapenemases that can be easily passed from one *Enterobacteriaceae* to another facilitating the transmission of resistance.
4. *Enterobacteriaceae* are common causes of infection in the community and healthcare settings.

■ WHAT IS THE DIFFERENCE BETWEEN CRE COLONIZATION AND INFECTION?

A clinical culture that is said to be colonized means that the organism is in the body, but is not causing any symptoms or disease. However, if those colonized CRE organisms gain access to sites in the body that are normally sterile like the bladder, lung or blood stream they are then referred to as infectious.

■ WHO IS AT THE MOST RISK OF ACQUIRING CRE?

People who have reduced mobility in healthcare settings and that are on antimicrobials are at the most risk of being exposed to CRE.

■ WHAT CAN CLINICIANS DO TO PREVENT CRE TRANSMISSION?

The most successful CRE elimination strategies in healthcare settings are ones that focus on recognizing cases early, placing colonized or infected patient on Contact Precautions, making sure to clean medical equipment thoroughly, and proper antimicrobial use. The CDC has put together a [toolkit](#) that has more detailed recommendations on CRE prevention in a healthcare setting.

■ WHAT INFECTIONS DOES CRE CAUSE?

Infections with CRE can happen almost anywhere in the body including the blood stream, ventilator-associated pneumonia, and intra-abdominal abscesses. Studies have shown that a majority of CRE infections are found in the urinary tract, many of whom have a urinary catheter or urinary retention.

■ HOW IS CRE TRANSMITTED?

CRE is typically spread from person to person, generally as a result of contact with the contaminated hands of medical personal or contaminated medical equipment. That is why it is important to use personal protective equipment and use good hand hygiene, especially after cleaning up stool or changing wound dressings. Also, special care must be taken to ensure that medical equipment is extensively cleaned.

■ WHEN CAN CONTACT PRECAUTIONS BE STOPPED IN CRE PATIENTS?

Unfortunately, there is not enough information for the CDC to make a general recommendation on when a patient who is either colonized or infected with CRE no longer needs to be isolated. However, multiple studies have shown that patients can be colonized with CRE for several months. Also, patients have been found to be intermittently positive on serial cultures, therefore it is best not to consider discontinuing Contact Precautions based on the results of only a single negative culture.

■ WHERE CAN I LEARN MORE ABOUT CRE?

Long Beach Department of Health and Human Services:
<http://www.longbeach.gov/cre>

California Department of Public Health:
<https://www.cdph.ca.gov/programs/hai/Pages/Carbapenem-ResistantEnterobacteriaceae.aspx>

Centers for Disease Control and Prevention:
<https://www.cdc.gov/hai/organisms/cre/cre-clinicianfaq.html>