

# Carbapenem-Resistant *Enterobacteriaceae* (CRE) in California

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Oakland

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# Presentation Objectives

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- Describe the epidemiology of CRE
- Review strategies for preventing CRE transmission
- Discuss CDPH plans for assisting hospitals with CRE prevention and control

# Background

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## *Enterobacteriaceae*

- Bacteria found in normal human gut flora and the environment
  - More than 70 species including *E. coli*, *Salmonella*, *Klebsiella*, *Enterobacter*, *Serratia*
- Can cause range of infections
  - UTI, wound infections, pneumonia, bacteremia
- Important cause of both healthcare and community-associated infections

# Treatment

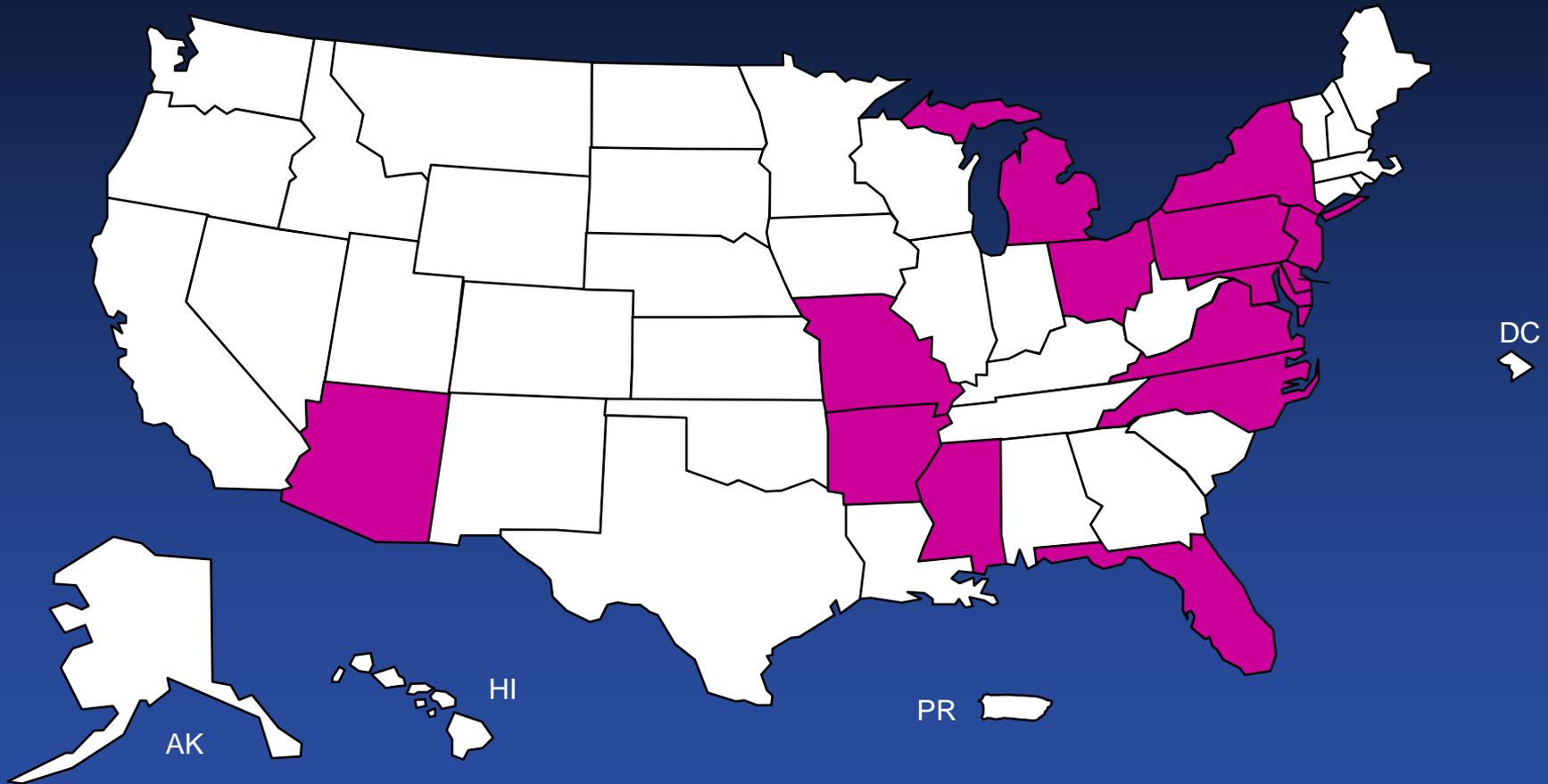
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- The first line of treatment are  $\beta$ -lactam antibiotics (i.e. penicillin)
- Resistance to  $\beta$ -lactam antibiotics began even before penicillin was developed
  - Many possess naturally occurring  $\beta$ -lactamase (an enzyme that inactivates  $\beta$ -lactam antibiotics) or have acquired resistance
- Our most potent class of  $\beta$ -lactams, carbapenems, remained effective against almost all *Enterobacteriaceae*

# *Klebsiella pneumoniae* carbapenemases (KPCs)

- Type of CRE
  - First identified in 1996
  - Renders all penicillins, cephalosporins, and carbapenems ineffective
  - Limits options for treatment
- *Enterobacteriaceae*:
  - Common – *Klebsiella pneumoniae*
  - Sporadic – *Escherichia coli*, *Enterobacter* species, *Serratia* species

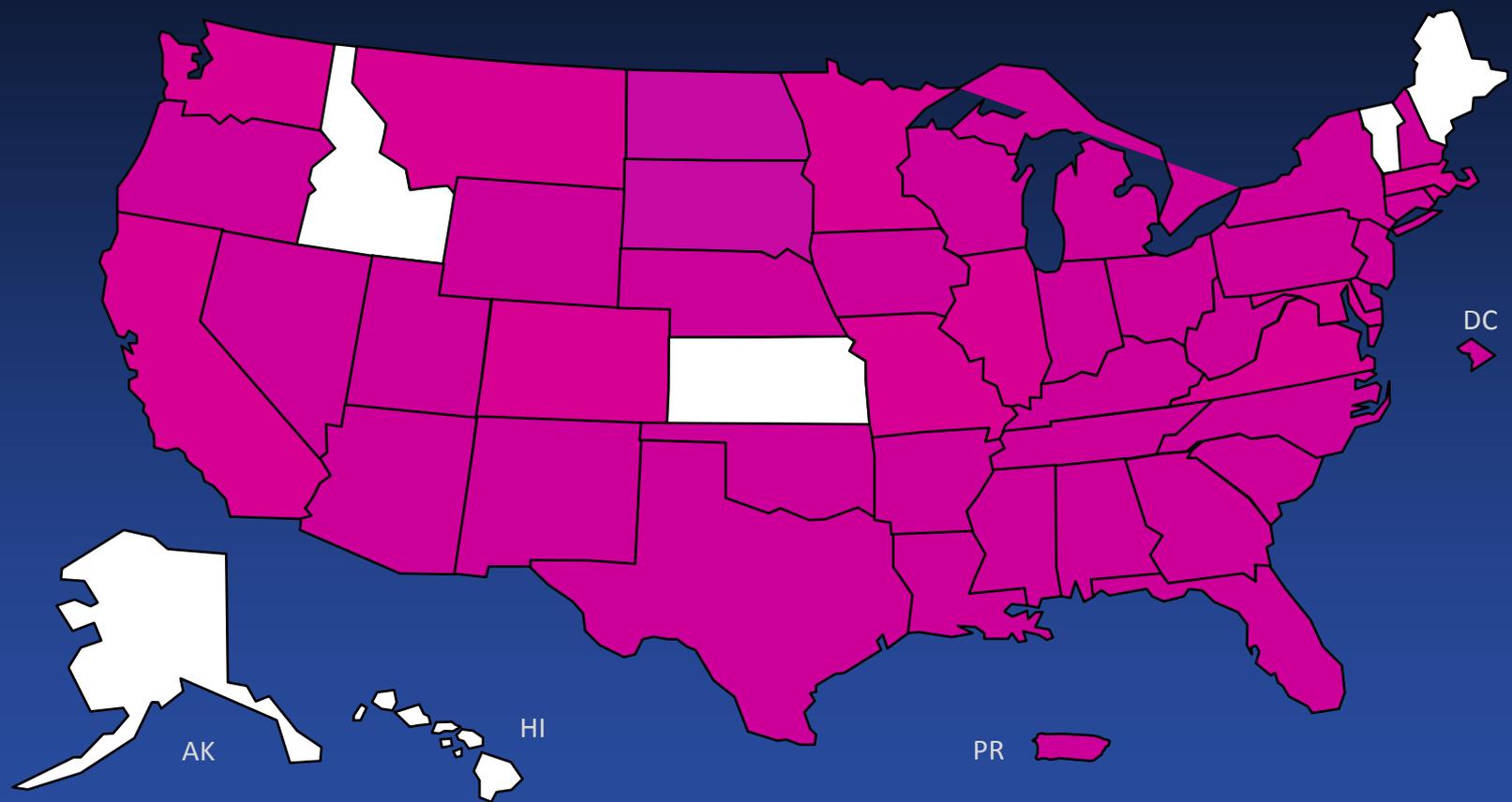
# KPC-producing CRE in the United States, 2006



Patel, Rasheed, Kitchel. 2009. Clin Micro News  
CDC, unpublished data

Courtesy of Alex Kallen, CDC

# Carbapenemase-producing CRE in the United States, 2013



Patel, Rasheed, Kitchel. 2009. Clin Micro News  
MMWR MMWR Morb Mortal Wkly Rep. 2010 Jun 25;59(24):750.  
MMWR Morb Mortal Wkly Rep. 2010 Sep 24;59(37):1212.  
CDC, unpublished data

Courtesy of Alex Kallen, CDC



# Defining CRE

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- No single surveillance definition
- Common definitions include
  - *Enterobacteriaceae* that are resistant, or show intermediate resistance, to at least one carbapenem and all third-generation cephalosporins

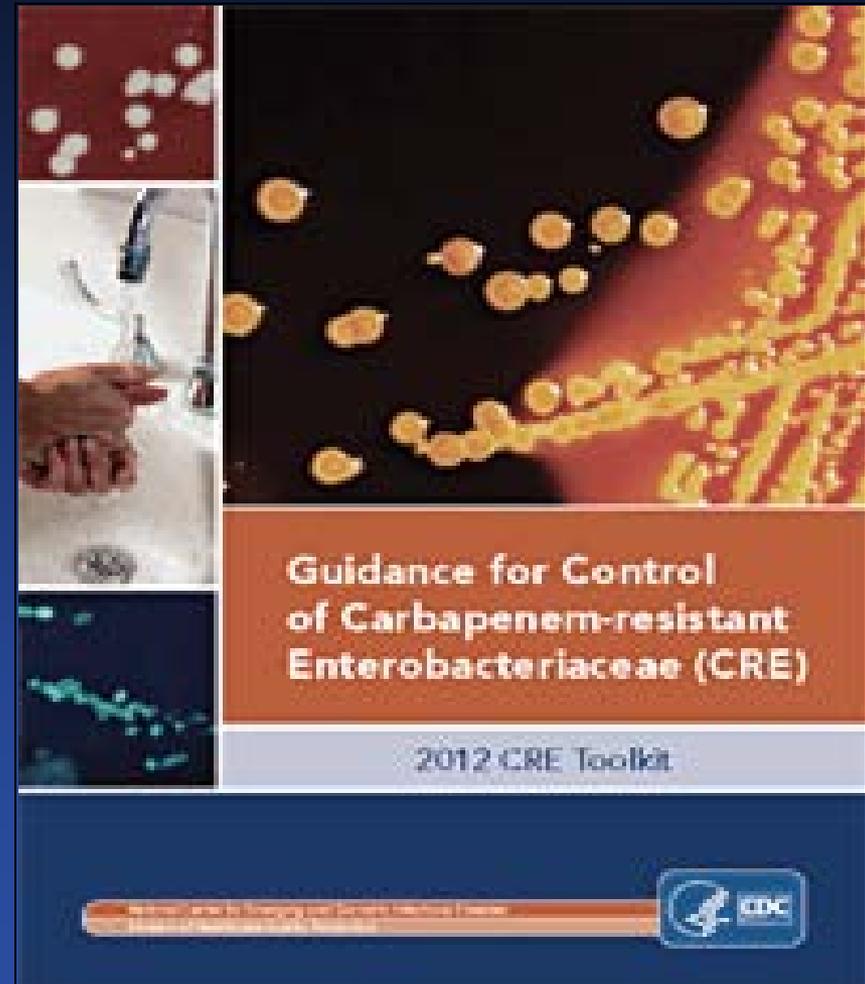
Or

  - *Enterobacteriaceae* that test positive for carbapenemase production by any method (e.g. Modified Hodge Test, disk diffusion, PCR)

# CDC CRE Prevention Toolkit, 2012

## Guidelines for Hospitals

- Recommends CRE prevention strategies
- To use toolkit effectively, hospitals encouraged to adjust surveillance and control measures according to regional prevalence



# CDC Prevention Strategies Framework

## Core Strategies

High levels of scientific evidence

Demonstrated feasibility

- Should become standard practice

## Supplemental Strategies

Some scientific evidence

Variable levels of feasibility

- Consider implementing in addition to Core when infections persist or rates are high

# CDC Toolkit Strategies for CRE Prevention

## Core Strategies

- Hand hygiene
- Contact Precautions
- HCP education
- Minimizing device use
- Patient and staff cohorting
- Laboratory notification
- Antimicrobial stewardship
- CRE screening

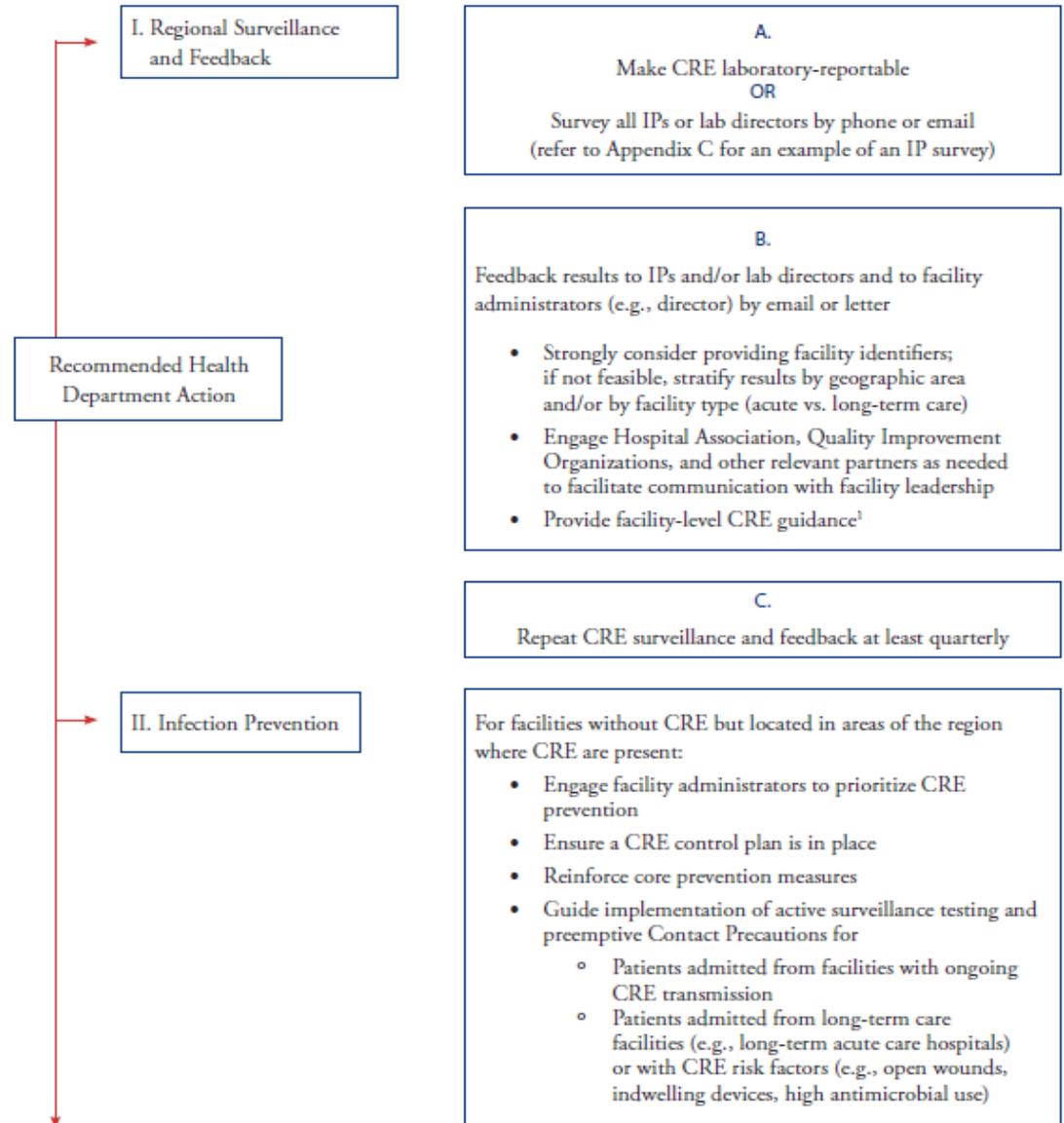
## Supplemental Strategies

- Active surveillance cultures
- Chlorhexidine bathing

## Regions with Few CRE Identified

In regions where CRE have been identified but cases remain uncommon, an aggressive approach to prevention is needed to prevent further transmission and widespread emergence of CRE. This will require increased prevention efforts targeting select facilities in the region where CRE are found.

# Additional guidance to hospitals based on CRE regional prevalence



# CDPH CRE Prevention Efforts

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All 391 California general acute care hospitals contacted:

- Educate hospital Infection Prevention personnel
- Determine regional CRE prevalence estimates
  - Casting a wide net by using a broad definition:  
*Enterobacteriaceae* that are resistant, or show intermediate resistance, to at least one carbapenem (excluding ertapenem) based on hospital laboratory breakpoints

# Progress and Next Steps

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- Phone contact and CRE survey complete in 225 hospitals
  - Provided education
  - Raised awareness
  - Improved internal and cross-facility communication and preparedness
- Final results anticipated in Spring 2014
  - Region-specific results and map to be available on HAI Program website
  - Region-specific education provided via webinar

# Summary

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- CRE in healthcare facilities poses a threat to patients because of limited treatment options
- Hospitals can prevent the transmission of CRE by following practices outlined in the CDC Toolkit
- CDPH is conducting a state-wide survey to assess regional prevalence and assist hospitals to tailor their CRE prevention strategies