

CDC Guidance for Control of Carbapenem-Resistant Enterobacteriaceae

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Carbapenem-Resistant Enterobacteriaceae (CRE)

- ❑ **CRE emergence and dissemination represent serious public health threat**
 - Associated with high mortality rates
 - Potential to spread widely
- ❑ **Current US distribution of CRE likely heterogeneous**
 - Despite the widespread dissemination of KPC-producing CRE
 - CRE found less frequently in some regions, more commonly in other regions (e.g., Northeast)
- ❑ **There is still a critical opportunity for CRE control**

2009 CDC/HICPAC CRE Recommendations



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Weekly

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Guidance for Control of Infections with Carbapenem-Resistant or Carbapenemase-Producing *Enterobacteriaceae* in Acute Care Facilities

Infection with carbapenem-resistant *Enterobacteriaceae* (CRE) or carbapenemase-producing *Enterobacteriaceae* is emerging as an important challenge in health-care settings (1). Currently, carbapenem-resistant *Klebsiella pneumoniae* (CRKP) is the species of CRE most commonly encountered in the United States. CRKP is resistant to almost all available antimicrobial agents, and infections with CRKP have been associated with high rates of morbidity and mortality, particularly among persons with prolonged hospitalization and those who are critically ill and exposed to invasive devices (e.g., ventilators or central venous catheters). This report provides updated recommendations from CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC) for the control of CRE or carbapenemase-producing *Enterobacteriaceae* in acute care (inpatient) facilities. For all acute care facilities, CDC and HICPAC recommend an aggressive infection control strategy, including managing all patients with CRE using contact precautions and implementing Clinical and Laboratory Standards Institute (CLSI) guidelines for detection of carbapenemase production. In areas where CRE are not endemic, acute care facilities should 1) review microbiology records for the preceding 6--12 months to determine whether CRE have been recovered at the facility, 2) if the review finds previously unrecognized CRE, perform a point prevalence culture survey in high-risk units to look for other cases of CRE, and 3) perform active surveillance cultures of patients with epidemiologic links to persons from whom CRE have been recovered. In areas where CRE are endemic, an increased likelihood exists for importation of CRE, and facilities should consider additional strategies to reduce rates of CRE (2). Acute care facilities should review these recommendations and implement appropriate strategies to limit the spread of these pathogens.

For CRKP, the most important mechanism of resistance is the production of a carbapenemase enzyme, *bla*_{kpc}. The gene that encodes the *bla*_{kpc} enzyme is carried on a mobile piece of genetic material (transposon), which increases the risk for dissemination. Since first described in North Carolina in 1999, CRKP has been identified in 24 states and is recovered routinely in certain hospitals in New York and New Jersey (3). Analysis of 2007 data regarding health-care--associated infections reported to CDC indicated that 8% of all *Klebsiella* isolates were CRKP, compared with fewer than 1% in 2000 (CDC, unpublished data, 2008). CRKP poses significant treatment challenges, and CRKP infections have been associated with increased mortality, length of stay, and increased cost (4). The emergence and spread of CRKP and other types of CRE is another in a series of worrisome public health developments regarding antimicrobial resistance among gram-negative bacteria and underscores the immediate need for aggressive detection and control strategies (5).

CRE in Long-Term Care Settings

- ❑ **Not just in acute care hospitals**
- ❑ **Since 2004, reports of CRE cases from Long-term acute care hospitals (LTACHs) and LTCF**
 - CRE prevalence as high as 50%, even with few infections present
- ❑ **Potential for large reservoir of patients with CRE**
 - Multiple comorbidities
 - Concentrated in one location for extended period of time

Inter-Facility Transmission of MDROs (Including CRE)

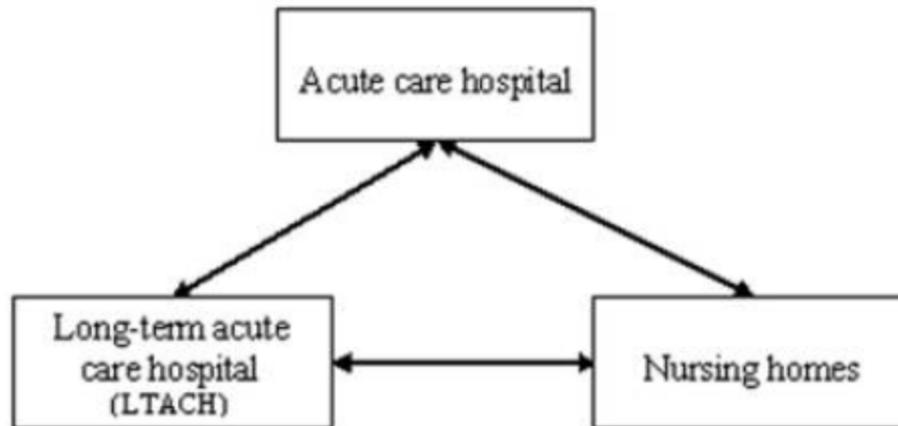


Figure 3. Patient flow among regional health care facilities. Outbreaks of infection with multidrug-resistant organisms have been found to follow the flow of colonized patients across institutions.

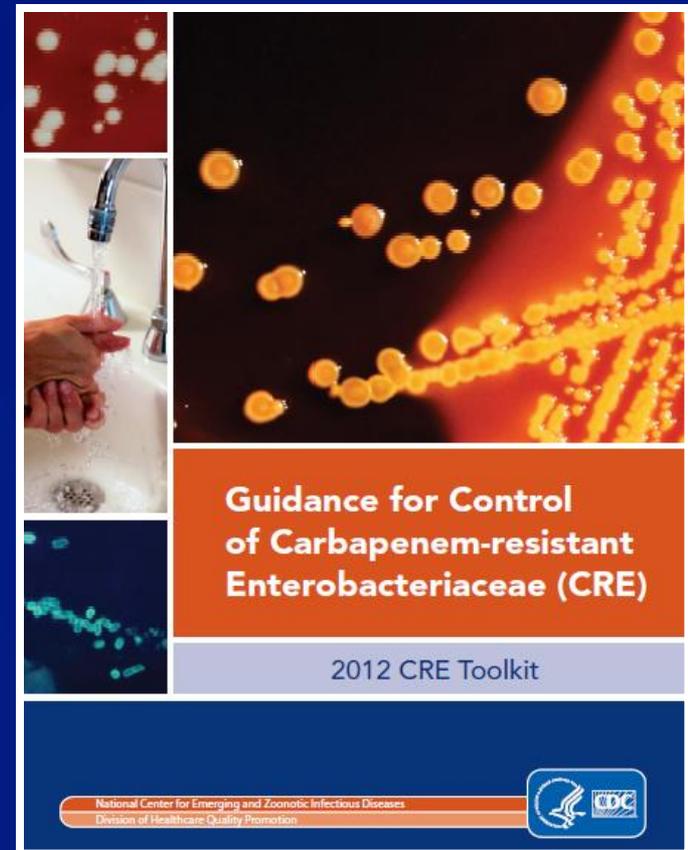
Current CDC Guidance for CRE Control

- ❑ **Requires coordinated regional effort involving all stakeholders**
 - Acute care *and* long term care facilities
 - Public health
- ❑ **Includes the following key principles:**
 - Recognizing the epidemiologic importance of CRE
 - Understanding the prevalence of CRE within a given region
 - Identifying colonized and infected patients in facilities
 - Implementing regional and facility-based interventions to halt transmission

2012 CRE Toolkit

Expands upon 2009 CDC/HICPAC recommendations:

- ❑ **Facility-level recommendations**
 - Acute care facilities
 - Long-term care facilities
- ❑ **Regional prevention strategy for health department implementation**



Surveillance and Definitions

- ❑ **Facilities/Regions should have an awareness of the prevalence of CRE in their facility/region**
 - Facilities – look-back of lab records (e.g., 6-12 months)
- ❑ **Could concentrate on select CRE**
 - *Klebsiella* spp., *E. coli*, *Enterobacter* spp.
- ❑ **CDC definition (based on 2012 CLSI definitions):**
 - Nonsusceptible to one of the carbapenems (doripenem, meropenem, imipenem)
 - Resistant to all 3rd generation cephalosporins tested
 - Some Enterobacteriaceae are intrinsically resistant to imipenem (*Morganella*, *Providencia*, *Proteus*)

FACILITY-LEVEL CRE PREVENTION

Facility-Level Measures: Acute and Long-Term Care Facilities

□ Core

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

□ Supplemental

- Active surveillance cultures
- Chlorhexidine bathing

Facility-Level Recommendations: Core Measures Hand Hygiene

- ❑ Educate staff with frequent in-services**
 - At orientation and periodically
- ❑ Monitor hand hygiene adherence and provide feedback of performance**
- ❑ Ensure access to hand hygiene stations**
 - Install alcohol-based hand gel dispensers in/near patient rooms
- ❑ Encourage use of alcohol-based hand gel dispensers in favor of soap and water (exceptions include when hands are visibly soiled)**

Facility-Level Recommendations: Core Measures Contact Precautions

- ❑ For patients colonized or infected with CRE**
- ❑ Consider pre-emptive CP in patients transferred from high-risk settings**
- ❑ Systems in place to identify patients at readmission**
- ❑ Ensure proper PPE wear by HCP**
- ❑ Monitor CP adherence and provide feedback**
- ❑ No recommendations for discontinuation of CP**

Contact Precautions in Long-Term Care Facilities

- ❑ CP could be modified in these settings
- ❑ Apply CP to residents with CRE who are at higher risk for transmission
 - Dependent upon HCP for their activities of daily living
 - Ventilator-dependent
 - Incontinent of stool
 - Wounds with drainage that is difficult to control
- ❑ For other residents (more functional), requirement for Contact Precautions might be relaxed
 - Emphasize hand hygiene, keep wounds covered
- ❑ Standard Precautions should still be observed

Facility-Level Recommendations: Core Measures

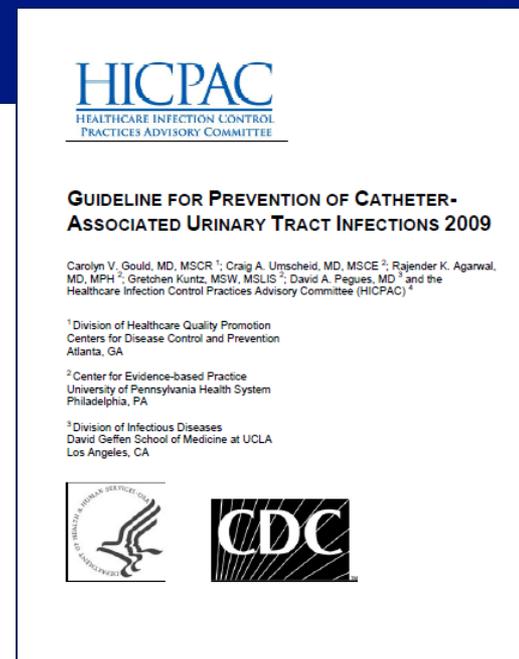
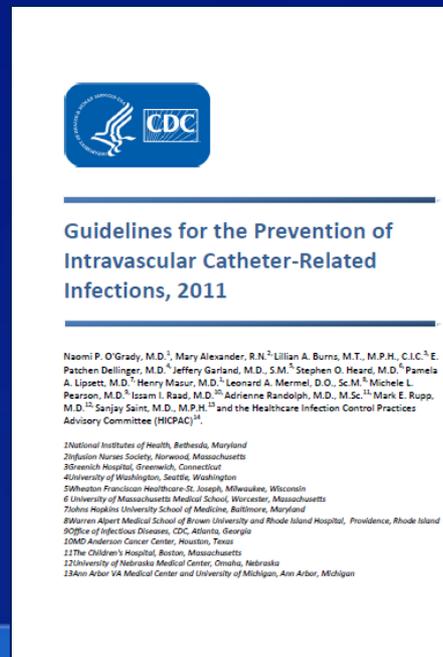
HCP Education

- ❑ **Regular education about MDRO prevention**
 - Hand hygiene
 - Contact Precautions
 - Appropriate handling/care of invasive devices



Facility-Level Recommendations: Core Measures Device Use

- ❑ Minimize use of invasive devices
- ❑ Ensure implementation of HICPAC recommendations:
 - Urinary catheters
 - Central lines



Facility-Level Recommendations: Core Measures Patient and Staff Cohorting

- ❑ **Place CRE patients in single-patient rooms**
 - If not available, cohort patients together in same room
 - Preference for single rooms should be given to patients at highest risk of transmission (e.g., stool incontinence, have medical devices, open wounds)
- ❑ **Cohort CRE patients to specific areas (e.g., units or wards) with dedicated staff**

Facility-Level Recommendations: Core Measures Laboratory Notification

- ❑ Perform appropriate laboratory screening for CRE (in accordance with CLSI guidance)**
- ❑ Have protocols in place for timely notification of appropriate staff when CRE are isolated**
 - Applies to on-site and off-site laboratories

Facility-Level Recommendations: Core Measures Promote Antimicrobial Stewardship

- ❑ Ensure appropriate indications and duration of use of antimicrobial therapy
- ❑ Use narrowest spectrum of antimicrobial that is appropriate

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A-Z Index A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #

Get Smart for Healthcare

Studies indicate that nearly 50% of antimicrobial use in hospitals is unnecessary or inappropriate. There is no doubt that this overuse of antibiotics is contributing to the growing challenges posed by *Clostridium difficile* and other antibiotic-resistant bacteria in many hospitals. However, studies also demonstrate that improving the use of antibiotics in hospitals can not only help reduce rates of *Clostridium difficile* infection and antibiotic resistance, but can also improve individual patient outcomes, all while saving hundreds of thousands of dollars in healthcare costs. *Get Smart for Healthcare* is a CDC campaign focused on improving antibiotic use in inpatient healthcare facilities, starting with hospitals and then expanding to long-term care facilities.

The goal of *Get Smart for Healthcare* is to optimize the use of antimicrobial agents in inpatient healthcare settings by focusing on strategies to help hospitals and other inpatient facilities implement interventions to improve antibiotic use. Interventions and programs designed to improve antibiotic use are also referred to as "antimicrobial stewardship."

Get Smart for Healthcare Topics

- Why Inpatient Stewardship?**
Benefits of antibiotic stewardship, Overview, Slide sets, Fast facts...
- Implementing and Improving Stewardship Efforts**
Tools, Getting Started...

Fast Facts



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Facility-Level Recommendations: Core Measures CRE Screening

- ❑ **Used to identify unrecognized CRE colonization among high-risk patients (e.g., CRE contacts)**
 - Point prevalence surveys
 - Rapid evaluation of CRE prevalence in particular wards/units
 - Do once if few or no additional CRE colonized patients identified
 - Do serially if colonization more widespread and/or to follow effect of intervention
 - Screening of epi-linked patients, e.g., roommates, patients who shared same HCP
- ❑ **Typically obtain cultures of stool, rectal, or peri-rectal**
 - Link to laboratory protocol
http://www.cdc.gov/ncidod/dhqp/pdf/ar/Klebsiella_or_E.coli.pdf

Facility-Level Recommendations: Supplemental Measures

- ❑ **Active surveillance testing – potential considerations:**
 - Patients who may not be epi-links to CRE cases, but meet certain pre-specified criteria
 - Admitted from high-risk settings , e.g., ICUs, LTCFs
 - Admitted from facilities with known CRE transmission
 - Generally done at admission with preemptive isolation of patient until results available

- ❑ **Chlorhexidine bathing – limited evidence for CRE:**
 - Acute care facilities – bathe patients with 2% chlorhexidine while in high-risk settings
 - LTCF – bathe high-risk patients with 2% chlorhexidine

REGIONAL CRE PREVENTION

Regional Approach to MDRO (CRE) Prevention is Essential

❑ Rationale for regional approach

- What happens in one facility will impact surrounding facilities
- Individual facilities can reduce MDRO prevalence only to a certain point

❑ Successful regional coordination by public health

- VRE control in Siouxsland region
- CRE containment in Israel

Important Role of Public Health in CRE Control

- ❑ **HDs in unique position to coordinate local and regional response to CRE**
 - Assess CRE prevalence/incidence within their jurisdiction in order to provide situational awareness to facilities
 - Serve as resource to facilities about prevention options

Regional Prevention Strategy

- ❑ **Health Department Coordination**
- ❑ **Aggressive approach to contain or prevent CRE emergence**
 - Regions with no CRE identified
 - Regions with few CRE identified
- ❑ **Broad approach is required in regions where CRE are common**

Regional Prevention Strategy

Regional Surveillance for CRE

- ❑ **Determine CRE prevalence within a given jurisdiction**
 - Make CRE laboratory reportable (in regions with no known or few CRE)
 - Survey IPs or lab directors
- ❑ **Feedback of surveillance results**

Regional Prevention Strategy

Regions With No CRE Identified

Aggressive efforts at detection:

- ❑ **Perform periodic surveillance and feedback**
 - Frequency may depend on CRE prevalence in neighboring regions (establish mechanism for communication)

- ❑ **Educate facility staff to increase awareness**
 - Epidemiologic importance of CRE
 - Recommended surveillance and prevention measures

Regional Prevention Strategy

Regions With Few CRE Identified

Aggressive efforts at containment, may target select areas:

- ❑ Implement infection prevention measures**
 - Reinforce core prevention measures in all facilities
 - Facilities with CRE: promote CRE screening and consider supplemental measures
 - Facilities without CRE: targeted surveillance testing, preemptive CP
- ❑ Use inter-facility patient transfer forms**
 - Indicate CRE status, open wounds/devices, antimicrobial therapy
- ❑ Educate facility staff to increase awareness**
- ❑ Perform periodic surveillance and feedback**

Regional Prevention Strategy

Regions Where CRE Are Common

Implementation of measures across all facilities:

- ❑ Dedicated HD personnel to engage facilities (including facility leadership)**
- ❑ Reinforce core prevention measures and implement supplemental measures**
- ❑ Regularly assess for compliance to prevention measures**
 - Share performance measures with facility leadership
- ❑ Use inter-facility patient transfer forms**
- ❑ Perform periodic surveillance and feedback**
 - Assess efficacy of interventions
 - Consider reporting of certain CRE events (e.g., fatalities)

Practical Steps for Implementing Regional CRE Prevention Strategy

- ❑ **Example strategies from 3 states: WI, OR, UT**
- ❑ **Components include:**
 - Establish advisory group of key stakeholders (IPs, ID physicians, LTCF representatives, Laboratory Directors, etc.)
 - Conduct surveillance for select CRE (lab reportable, NHSN)
 - Follow up on every CRE case – track patient movement across healthcare settings to ensure recommendations implemented
 - Improve interfacility communication of CRE patient transfers
 - Engage Hospital Preparedness and EMS personnel
 - Work with neighboring states to track transmission between states
 - Engage Local Health Departments
 - Provide educational seminars and materials, including patient FAQs



Thank you

For more information please contact Centers for Disease Control and Prevention

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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