



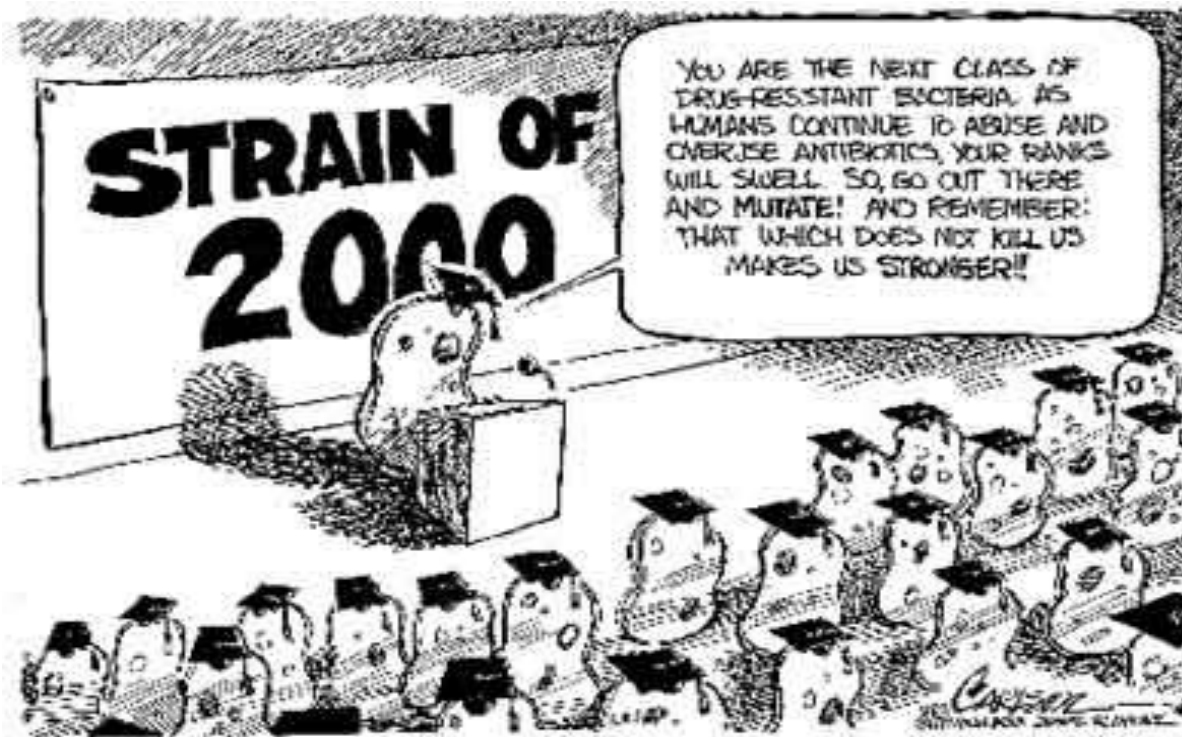
**Department
of Health**

Carbapenem-Resistant Enterobacteriaceae (CRE) in NYS

Overview for a Coordinated Approach to Prevention in LTCF

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**Rosalie Giardina, MT (ASCP)
Healthcare Epidemiology & Infection Control
CRE Prevention Coordinator**



CRE – Overview

What are Enterobacteriaceae?

- Family of bacteria that include *Klebsiella* sp., *Enterobacter* sp. and *Escherichia coli* (*E. coli*) - found in normal human intestines (gut).
- These bacteria can spread outside the gut and cause serious infections: pneumonia, bloodstream infections, urinary tract infections, wound infections, and meningitis.
- Enterobacteriaceae are one of the most common causes of bacterial infections in both healthcare and community settings.
- Carbapenems are a class of antibiotic frequently used to treat severe infections.

Carbapenem-resistant Enterobacteriaceae (CRE)

Overview

- The emergence and dissemination of CRE in the US represent a serious threat to public health
- Invasive CRE infections (e.g., bloodstream infections) are associated with mortality rates as high as 40 -50%
- CRE have the potential to spread rapidly (especially those that produce carbapenemases)
- Heterogeneous distribution:
 - May be more commonly isolated in some parts of US, but not regularly found in others
 - Identified in 48 of 50 states in US (not in Maine & Idaho yet)
- Well-described outbreaks have occurred in this country and others

Who is at risk for CRE?

- Healthy people **usually** don't get CRE infections.
- CRE most often spread person-to-person in healthcare settings through contact with infected or colonized people, particularly contact with wounds or stool
- Risk factors for CRE include :
 - Previous admission in a healthcare facility (acute & long-term care settings)
 - Mechanical ventilation
 - Invasive devices (i.e., IV catheters, urinary catheters, central lines, etc.)
 - Use of (overuse of) certain types of antibiotics
 - Co-morbidities; Immuno-compromised status
- CRE has also been documented to have spread through the use of ineffectively disinfected duodenoscopes during ERCP procedures (*endoscopic retrograde cholangio-pancreatography*)





It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.

Carbapenem-resistant Enterobacteriaceae (CRE)

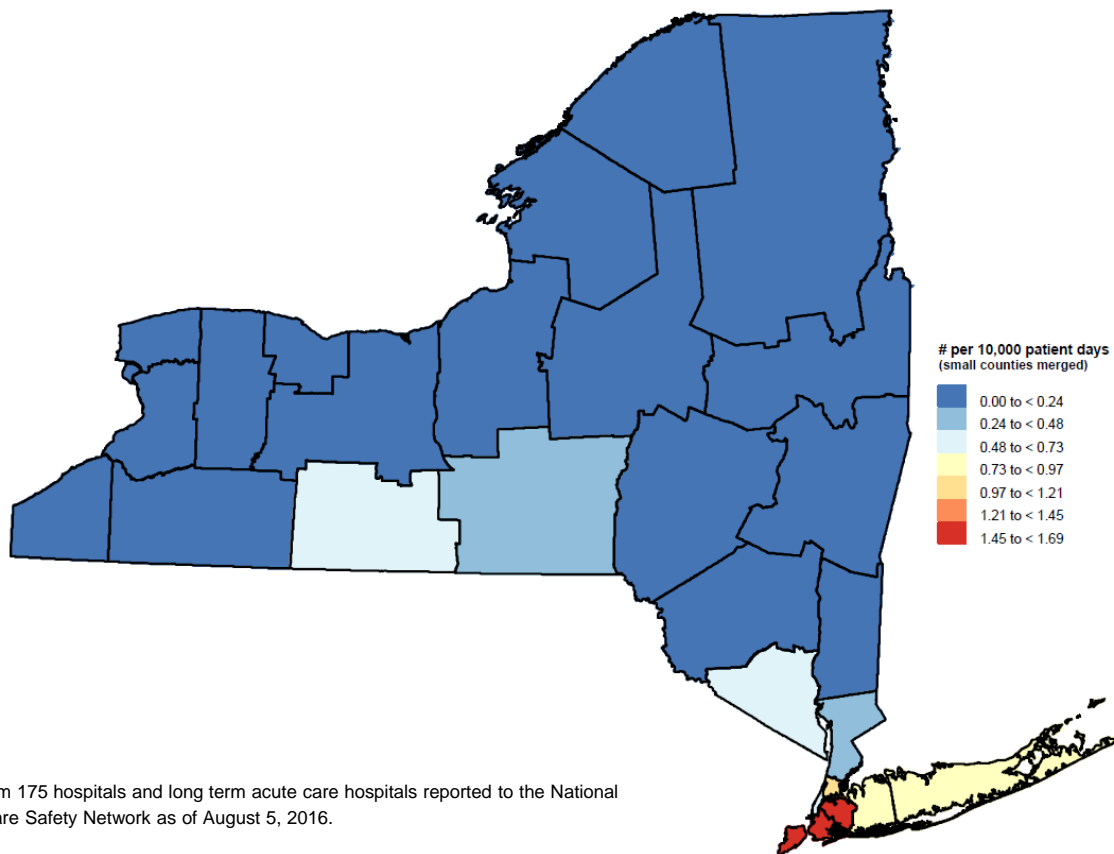
Mechanisms of Carbapenem Resistance

1. Some CRE possess a β -lactamase (e.g. AmpC or extended-spectrum β -lactamase [ESBL]) which, when combined with porin mutations, can render an organism nonsusceptible to carbapenems **(non-CP-CRE)**
2. Some CRE possess a carbapenemase (carbapenemase-producing [CP] CRE that directly breaks down carbapenems. **(CP-CRE)**
 - Carbapenemases on mobile genetic elements can transfer resistance among Enterobacteriaceae and other gram-negative organisms.
 - CP-CRE - first US isolate in 1996; disseminated widely since that time
 - **KPC** – *K*lebsiella *p*neumoniae *c*arbapenemase – represent the majority of isolates in US and New York state
 - Other enzymes, i.e., NDM-1, VIM, and IMP, can breakdown carbapenems but they are uncommon in the US
 - The rapid spread of CP-CRE have made these organisms a particularly important target for prevention



CRE in NYS

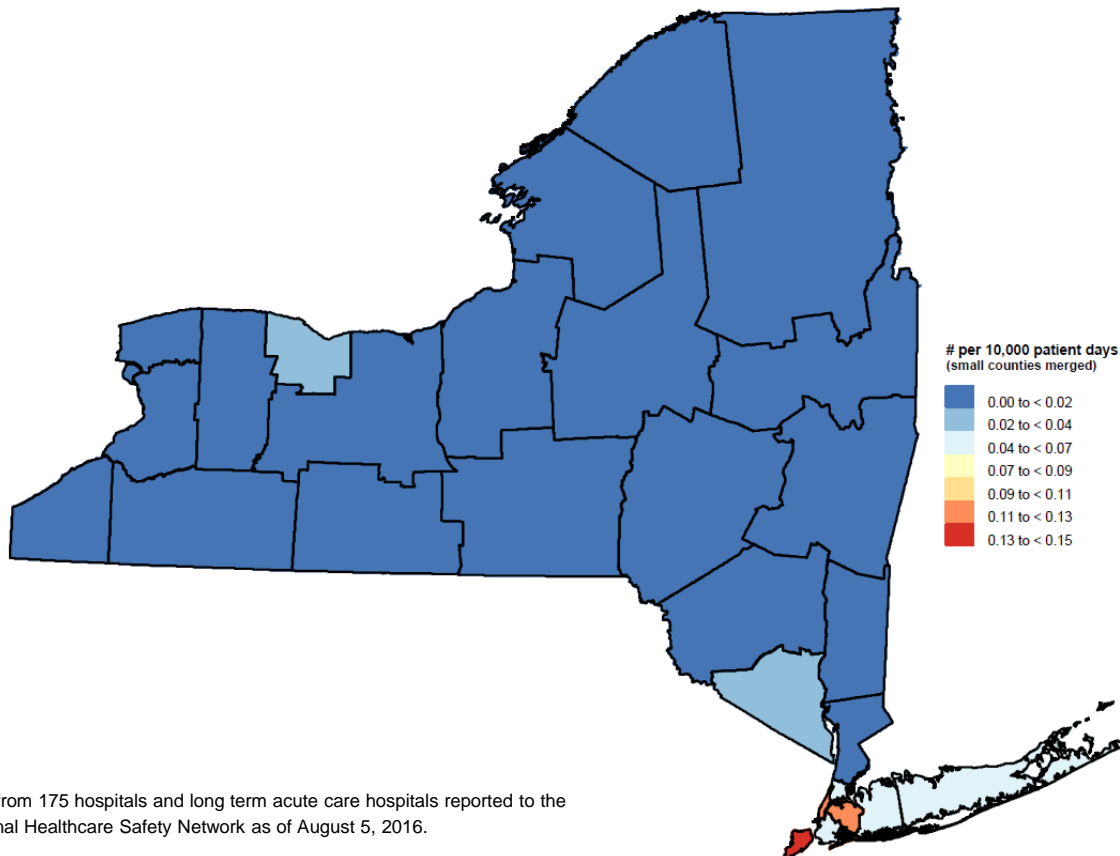
CRE-*Klebsiella* Infection/Colonization Incidence Rate NYS 2015 **



** This rate is the number of first labID events from any body site (e.g. urine, respiratory tract, blood) per patient per hospital among those with no documented evidence of previous infection or colonization with this specific organism type at the same hospital, identified more than three days after admission to the hospital, per 10,000 patient days.

Data from 175 hospitals and long term acute care hospitals reported to the National Healthcare Safety Network as of August 5, 2016.

CRE-*E. coli* Infection/Colonization Incidence Rate NYS 2015 **

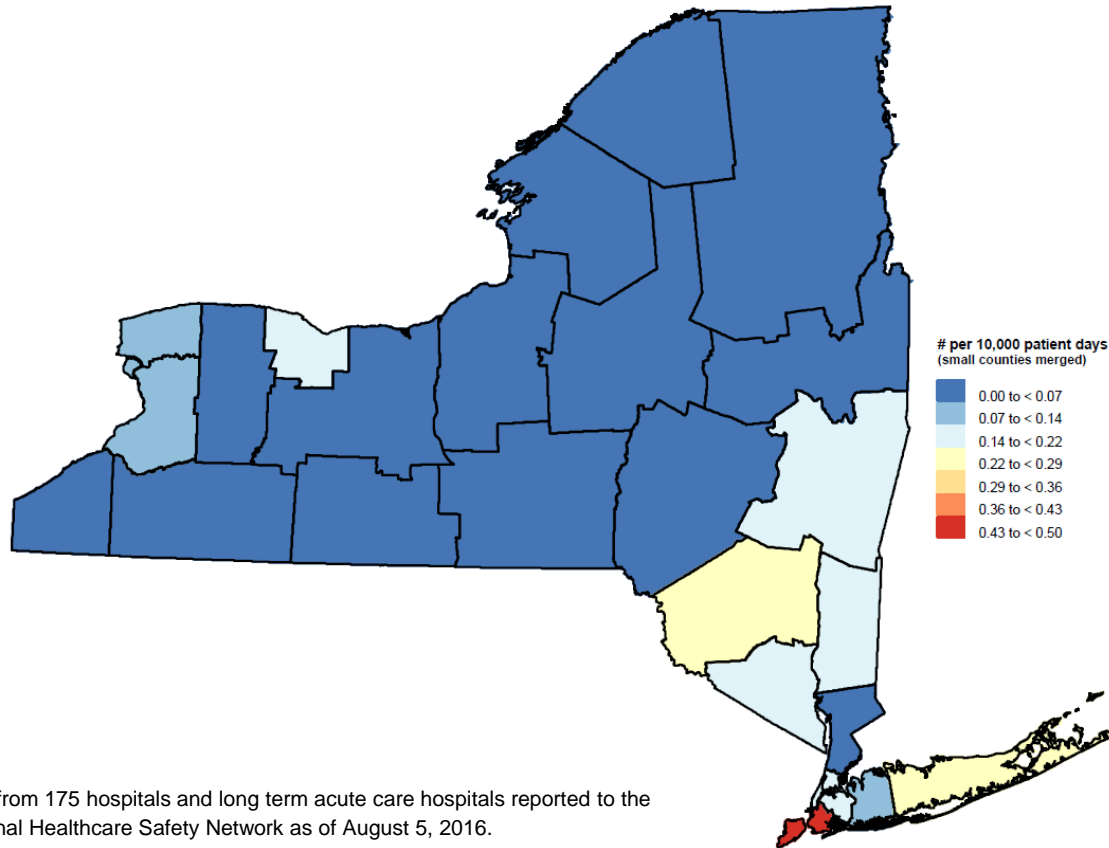


** This rate is the number of first labID events from any body site (e.g. urine, respiratory tract, blood) per patient per hospital among those with no documented evidence of previous infection or colonization with this specific organism type at the same hospital, identified more than three days after admission to the hospital, per 10,000 patient days.

Please note that CRE-*E.coli* incidence rates are **one-tenth** that of CRE-*Klebsiella* incidence rates.

Data from 175 hospitals and long term acute care hospitals reported to the National Healthcare Safety Network as of August 5, 2016.

CRE-*Enterobacter* Infection/Colonization Incidence Rate NYS 2015 **



** This rate is the number of first labID events from any body site (e.g. urine, respiratory tract, blood) per patient per hospital among those with no documented evidence of previous infection or colonization with this specific organism type at the same hospital, identified more than three days after admission to the hospital, per 10,000 patient days.

Data from 175 hospitals and long term acute care hospitals reported to the National Healthcare Safety Network as of August 5, 2016.

CRE in NYS, 2013-2015

Community Onset *(CO) vs. Hospital Onset (HO) - STATEWIDE

Summary of CO vs HO CRE Cases

	CO-all		HO-all		CO-BSI only		HO-BSI only	
	# of cases	Percent (%)	# of cases	Percent (%)	# of cases	Percent (%)	# of cases	Percent (%)
2013	1,636	50.2%	1,622	49.8%	180	39%	282	61%
2014	1,346	50.1%	1,345	49.9%	123	33%	249	67%
2015 †	1,388	52%	1,285	48%	130	37%	223	63%

2013 Total CRE cases = 3,258; total BSI = 462

2014 Total CRE cases = 2,691; total BSI = 372

† 2015 Total CRE cases = 2,673; total BSI = 353

*CO = patients coming from home/community or other healthcare facilities (i.e., LTACHs, SNFs)

† 2015 data is preliminary

Challenges



By Frits Ahlefeldt

Infection Prevention Challenges in LTCFs

Patient-centered:

1. Resident factors
2. Unintended Consequences of Contact Precautions
3. Antibiotic Misuse

Facility-centered:

1. Facility design
2. Environmental cleaning
3. Staffing levels/nurse turnover rate
4. Resources for Infection prevention program
5. Laboratory testing methods



Infection Prevention Challenges in LTCFs

Patient-Centered: Antibiotic Misuse

Up to 70% of NH residents received antibiotics during a year^{1,2}

Up to 75% of antibiotics are prescribed incorrectly^{1,2}

- Given when they are not needed
- Administered at the wrong dose
- Continued when no longer necessary
- Not taken by patient for prescribed duration
- Wrong antibiotic selected
 - Drug-bug mismatches
 - Broad spectrum vs narrow spectrum
- Used without appropriate monitoring
 - Side effects
 - Drug interactions



“Time for your morning medication...
and I understand you haven’t been
eating very much.”

1. Lim CJ et al. *Clin Interv Aging*. 2014; 9:165-177

2. Nicolle LE et al. *ICHE* 2000;21:537-45.

Infection Prevention Challenges in LTCFs

Patient-Centered: Antibiotic Misuse

Assessments are made by a surrogate rather than a prescriber¹

- 67% of antibiotic prescriptions ordered over the phone

Limited documentation of assessments in medical record¹

- 43% of NH-initiated antibiotic courses had no documentation of infection in medical record

Communication issues²

- RN/MD telephone communication as barrier to optimum antibiotic use
- Lack of nurse preparation before the call
- Lack of engagement from covering providers (unfamiliar with resident)
- Trust between healthcare team (based on familiarity)
- Lack of physician responsiveness
- Language barriers/misunderstanding of medical terminology (frequent clarifications)

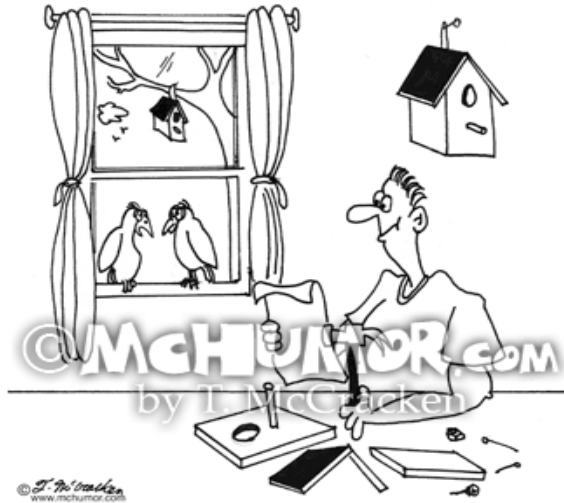
1. Richards et al. *J Am Med Dir Assoc.* 2005;6(2):109-12.

2. Tija J et al. *J Patient Saf.* 2009;5:145-152.



Infection Prevention Challenges in LTCFs

Facility-Centered



"IT'S ALWAYS THE SAME DESIGN. I WISH HE'D GET
A MORE IMAGINATIVE SET OF HOUSE PLANS."

1. Facility design

- Number of single vs. multi-bedded rooms
- Location of sinks/ hand sanitizing 'stations'/ PPE

2. Environmental Cleaning

- Appropriateness/effectiveness of product(s) –
Persistence of MDROs: Weeks to **MANY** months
Spores: 5-6 months
- Effectiveness of cleaning PROCESS –
cleaning vs. disinfection, drying times
- Education and training of environmental personnel -
monitoring and feedback

Infection Prevention Challenges in LTCFs

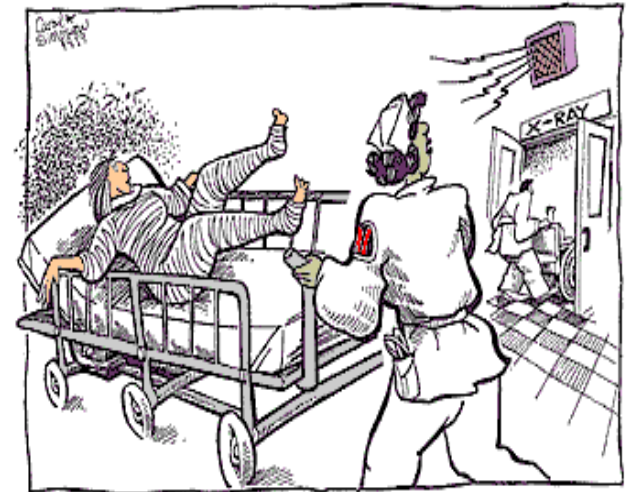
Facility-Centered

3. Staffing levels/ nurse turnover rate

- # of ICPs per NH bed is 4-fold fewer than # of ICPs in acute care hospitals
- NH nurse more likely to assume multiple roles/responsibilities in addition to infection prevention (general duty nursing, nursing supervision, in-service education, employee health, quality assurance, etc.)
- The turnover rate in long-term care ranges from 55% to 75% for nurses and aides and sometimes over 100% for aides alone¹

4. Strength of the infection prevention program

- LTCF ICPs less likely to receive additional formal education in IC (8%) as compared with 95% of acute care ICPs



*"Nurse Adams, please report to rooms 13 through 100 immediately...
you have patients who need your attention."*

1. Barbera EF. *The Keys to Reducing Turnover in Long Term Care*. McKnight's. Feb 6, 2014.

CRE – Reporting Requirements

CRE Reporting Requirements



CDC has designated CRE as an **URGENT** * threat, **YET:**

CRE infections are not a nationally notifiable condition

- There is no requirement to report CRE to the CDC
- Despite the high prevalence of CRE in NYS, few outbreaks are reported through the Nosocomial Outbreak Reporting Application (NORA) = *New York State reporting system*
- Although reportable through the NYS HAI Reporting Program, **at this time** it is not a reportable communicable disease mandated under the NYS Sanitary code (10NYCRR 2.10,2.14)

However, its seriousness warrants reporting through NORA when it is the **FIRST isolate** identified by the facility or if an **OUTBREAK** is suspected or identified

* an immediate public threat that requires urgent and aggressive action

CRE Reporting – NHSN+ LabID Event Module

Long term care facility (LTCF) component: *National reporting system*

CDC's National Healthcare Safety Network provides LTCFs with:

- a customized system to track infections
- ability to identify problems and track progress toward stopping infections
- data entered into NHSN will gauge progress toward national healthcare-associated infection goals.
- meant to help meet criteria outlined in the guidelines for the prevention, control and surveillance of MDRO* and CDI† (these pathogens may require specialized monitoring to evaluate if intensified infection control efforts are required to reduce occurrence of these organisms and related infections)

+NHSN = National Healthcare Safety Network; * Multidrug-resistant organisms; † *Clostridium difficile* infection

CRE Reporting – NHSN* LabID Event Module

Long term care facility (LTCF) component

Facilities must indicate their reporting plan for each calendar month

The following organisms can be selected for tracking:

- MRSA
- VRE
- CephR-Klebsiella
- CRE -Ecoli
 - Klebsiella
 - Enterobacter
- MDR-Acinetobacter

Only report isolates from clinical specimens

NHSN Home

Alerts

Reporting Plan

- ▢ Add
- ▢ Find

Resident Event

Summary Data

Analysis

Surveys

Users

Facility Group

Log Out

Logged into State Skilled Nursing Test Facility (ID 33149) as CORALIE.
 Facility State Skilled Nursing Test Facility (ID 33149) is following the LTCF component.

Mandatory fields marked with *

Facility ID*:

Month*:

Year*:

No Long Term Care Facility Component Modules Followed this Month

HAI Module [HELP](#)

	Locations	UTI
	Facility-wide Inpatient (FacWIDEIn) \	<input type="checkbox"/>

LabID Event Module [HELP](#)

	Locations	Specific Organism Type	Lab ID Event All Specimens
	Facility-wide Inpatient (FacWIDEIn) \	CRE - CRE (CRE-Ecoli, CRE-Enterobacter, CRE-Klebsiella) \	<input checked="" type="checkbox"/>

Prevention Process Measure Module [HELP](#)

	Locations	Hand Hygiene	Gown and Gloves Use
	Facility-wide Inpatient (FacWIDEIn) \	<input type="checkbox"/>	<input type="checkbox"/>

Add Monthly Reporting Plan

[HELP](#)

CRE Reporting – NHSN* LabID Event Module

Long term care facility (LTCF) component

Numerator:

LabID events

Denominators:

resident admissions

resident days

Categorizations based on admission and specimen dates:

Community-onset (CO)

vs.

Long-term care facility-onset (LO)

Rates = # CO or LO) events/
1000 resident days

- Alerts
- Reporting Plan
- Resident
- Event
- Summary Data
 - Add
 - Find
 - Incomplete**
- Analysis
- Surveys
- Users
- Facility
- Group
- Log Out

Add Monthly Summary Data

[HELP](#)

Mandatory fields marked with *

Fields required for record completion marked with **

Facility ID*:

Month*:

Year*:

Denominators for Long Term Care Locations

Location Code	Total Resident Days	Urinary Catheter Days	Report No UTI	New Antibiotic Starts for UTI Indication	
<input type="checkbox"/> Facility-wide Inpatient (FacWIDEIn) \	<input type="text" value=""/> *	<input type="text" value=""/> *	<input type="checkbox"/>	<input type="text" value=""/> *	

MDRO & CDI LabID Event Reporting

Location Code		MRSA	VRE	CephR-Klebsiella	CRE-Ecoli	CRE-Enterobacter	CRE-Klebsiella
<input type="checkbox"/> Facility-wide Inpatient (FacWIDEIn) \	Resident Admissions: <input type="text" value=""/> *						
	Resident Days: <input type="text" value=""/> *	LabID Event (All specimens) Report No Events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Number of Admissions on C. diff Treatment: <input type="text" value=""/> *		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Interventions for Prevention and Control of CRE



Interventions for Prevention and Control of CRE

National level:

National Action Plan for Combatting Antibiotic Resistance

White House, March 2015

State-wide Level:

New York State Antimicrobial Resistance (AR) Prevention and Control Taskforce

NYS Department of Health, October 2015

Facility-wide Level:

Facility-wide Guidance for Control of Carbapenem-Resistant Enterobacteriaceae (CRE) – November 2015 Update – CRE Toolkit (CDC)

2015 CDC CRE Toolkit

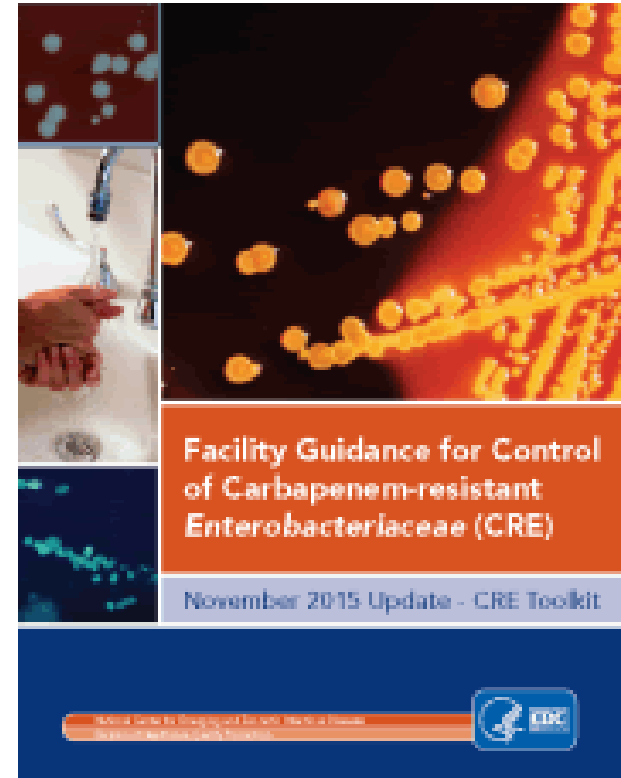
Facility-level Prevention Strategies for Acute and Long-Term Care:

1. Hand hygiene
2. Contact precautions
3. Healthcare personnel education
4. Use of devices
5. Laboratory notification
6. Inter-facility communication/identification of CRE patients at admission
7. Antimicrobial stewardship
8. Environmental cleaning
9. Patient and staff cohorting
10. Screening contacts of CRE patients
11. Active surveillance testing
12. Chlorhexidine bathing

Interventions to be used
for ALL CRE isolates



<http://www.cdc.gov/hai/organisms/cre/cre-toolkit/index.html>



Hand Hygiene



Ensure routine adherence to hand hygiene:

- Before touching a resident, even if gloves will be worn
- Before exiting the resident's care area after touching the resident or the resident's immediate environment
- After contact with blood, body fluids or excretions, or wound dressings
- Before performing an aseptic task such as capillary blood glucose testing or giving a subcutaneous injection (must wear gloves)
- If hands move from contaminated body sites to clean body sites during resident care
- After glove removal

Contact Precautions in Long Term Care Settings

“Use of contact precautions... should be guided by the potential risk that residents will serve as a source for additional transmission based on their functional and clinical status and the type of care activity that is being performed”



Proper Use of Contact Precautions Includes:

- Performing hand hygiene before donning a gown and gloves
- Donning gown and gloves before entering the affected patient's room
- Removing the gown and gloves and performing hand hygiene prior to exiting the affected patient's room

Ensure sufficient and appropriate PPE (gloves, gowns, face masks) is available and readily accessible, and care-givers understand and are trained on when and how to use it

Contact Precautions in High-acuity, Post-acute Care Settings

Use Contact Precautions for:

- Higher-risk residents colonized or infected with CRE, regardless of carbapenemase production†
 - ventilator-dependent
 - incontinent of stool that is difficult to contain,
 - have draining secretions or wounds that cannot be controlled

† In areas where CRE is considered to be endemic, such as in New York City, treat all CRE as (CP)-CRE

- Empiric Contact Precautions, for patients transferred from high-risk settings‡
(in conjunction with, and pending results of, screening cultures on admission to LTCF).

‡ Facilities in countries or areas of the US where (CP)-CRE is common, or facilities known to have outbreaks or clusters of (CP)-CRE colonized or infected patients



Contact Precautions in Lower-acuity, Post-acute Care Settings

- In Lower-risk residents less dependent on healthcare providers (HCP) for their activities of daily living (i.e., are able to perform hand hygiene, and contain their stool and secretions), use of gown and gloves should be based on the type of care provided, when there is potential for exposure to their fluids or secretions, or if there is a risk of the HCP contaminating their clothes:
 - Bathing residents
 - Assisting residents with toileting
 - Changing a wound dressing
 - Manipulating patient devices (e.g., urinary catheter)
- Gowns and gloves may not be needed if there is a minimal potential for cross-contamination from residents or their environment
 - Setting a tray down in the room
 - Entering the room without contacting the resident or their immediate environment

Contact Precautions in Lower-acuity, Post-acute Care Settings



Lower-risk residents do not need to be restricted from common gatherings in the facility (e.g., meals, group activities)

However, emphasis on resident education is vital for this strategy to be successful

Reinforce resident hand hygiene



How does the application of Contact Precautions in Lower-acuity, Post-acute Care Settings differ from Standard Precautions

Standard Precautions constitutes the *primary strategy* for the prevention of healthcare-associated transmission of infectious agents among patients and healthcare personnel.

- *To be used during any potential interaction with any patient (or resident) regardless of suspected or confirmed diagnosis or presumed infection status in any setting in which healthcare is delivered*

Contact Precautions are *additional* control measures used to effectively prevent transmission of infectious agents (suspected or confirmed), including epidemiologically important microorganisms (of which CRE is one), which are spread by direct or indirect contact with the patient (resident) or the patient's (resident's) environment

- *To be used **to protect patients, healthcare workers AND the environment** from transmission and spread*

Discontinuing Contact Precautions for CRE

There is not enough evidence to make firm recommendations

Be aware that:

- CRE colonization can be prolonged (> 6 months)
- If surveillance cultures are used to decide if a patient remains colonized, more than one culture should be collected to improve sensitivity (although no recommendations on timing, spacing, etc. of specimens)
- Presence of risk factors for ongoing carriage or ongoing CRE exposure should be considered in the decision about discontinuing contact precautions
- Predictors of rectal CRE carriage include:
 - previous exposure to antimicrobials
 - admission from another healthcare facility
 - < 3 months' elapsed time since first positive CRE test

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 <i>Check if YES</i>	Active infection on Treatment <i>Check if YES</i>
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"/> Central line/PICC (Approx. date inserted __/__/____) |
| <input type="checkbox"/> Diarrhea | <input type="checkbox"/> Hemodialysis catheter |
| <input type="checkbox"/> Vomiting | <input type="checkbox"/> Urinary catheter (Approx. date inserted __/__/____) |
| <input type="checkbox"/> Incontinent of urine or stool | <input type="checkbox"/> Suprapubic catheter |
| <input type="checkbox"/> Open wounds or wounds requiring dressing change | <input type="checkbox"/> Percutaneous gastrostomy tube |
| <input type="checkbox"/> Drainage (source) _____ | <input type="checkbox"/> Tracheostomy |

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

Antibiotic and dose	Treatment for:	Start date	Anticipated stop date

Inter-facility Communication/ Identification of CRE Patients at Admission

- Facilities that are transferring patients colonized or infected with CRE must notify the receiving facility of the patient’s CRE status so that appropriate infection prevention measures can be promptly implemented upon the patient’s/resident’s arrival.
- Additional information to include on the inter-facility transfer form:
 - Presence of existing invasive devices (e.g., indwelling catheters)
 - Ongoing antimicrobial therapy
 - Bedside care issues (*continence, wounds, etc.*)



Antimicrobial Stewardship Programs (ASP) in NHs

Antibiotic stewardship refers to a set of commitments and activities designed to optimize the treatment of infections while reducing the adverse events associated with antibiotic use

There are 7 core elements for ASP in Nursing Homes

Nursing homes are encouraged to select one or two activities to start with and over time, as improvements are implemented, expand efforts to add new strategies to continue improving antibiotic use

Use the ASP checklist:

- as a baseline assessment of policies and practices
- to review progress



Checklist for Core Elements
of Antibiotic Stewardship in
Nursing Homes



Summary of Core Elements for Antibiotic Stewardship in Nursing Homes



Leadership commitment

Demonstrate support and commitment to safe and appropriate antibiotic use in your facility



Accountability

Identify physician, nursing and pharmacy leads responsible for promoting and overseeing antibiotic stewardship activities in your facility



Drug expertise

Establish access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship for your facility



Action

Implement **at least one** policy or practice to improve antibiotic use



Tracking

Monitor **at least one process** measure of antibiotic use and **at least one outcome** from antibiotic use in your facility



Reporting

Provide regular feedback on antibiotic use and resistance to prescribing clinicians, nursing staff and other relevant staff

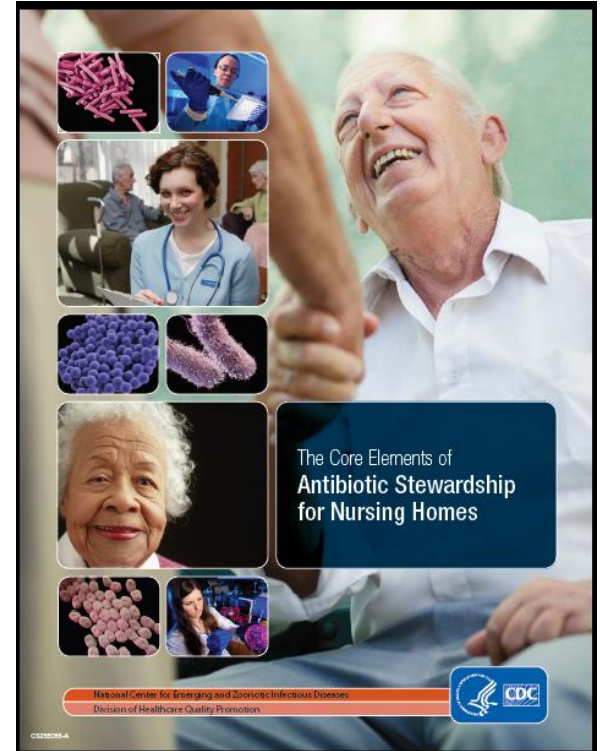


Education

Provide resources to clinicians, nursing staff, residents and families about antibiotic resistance and opportunities for improving antibiotic use

Antimicrobial Stewardship

Ensure Antibiotic stewardship policies and practices are in place to protect patients and improve clinical care in Nursing Homes



Environmental Cleaning

Evidence from CRE outbreaks suggests that the environment can serve as a source for transmission:

- Areas in close proximity to the patient/resident (*e.g., bed rails, patient tray tables*)
- Frequently shared equipment (*e.g., patient lifts, shower chairs, other bathing/therapy equipment, wheelchairs*)

CRE have been found in **sink drains** in patient rooms:

- Clean and disinfect surfaces around sinks regularly
- Do not store medical equipment or patient supplies near sinks, as splash or aerosolization from sinks could possibly contaminate these clean items

Perform terminal cleaning of CRE patient rooms upon patient discharge.

Use cleaning and disinfection products *according to manufacturer guidelines*

Monitor effectiveness of environmental cleaning
(*ATP, fluorescent markers*)

Burden of Multidrug-resistant Organisms (MDROs) in LTC

LTCFs serve as an important reservoir for MDROs

- Reported prevalence rates of antimicrobial resistant bacteria in LTCFs are similar to patients in ICUs
- Several studies have shown the carriage prevalence of multidrug-resistant gram negative bacilli (MDR-GNB) has far exceeded that of MRSA and VRE in LTCFs ¹
- Residents with indwelling devices have a higher prevalence of MDRO colonization at multiple anatomical sites ¹
- Hands of HCWs in NHs are frequently colonized with GNB (66%), *Candida* (44%), *S. aureus* (20%), VRE (6%) ¹
- Paucity of randomized clinical trials to reduce device-associated MDRO colonization and infections in LTCFs ¹

¹ Mody L et al. JAMA Intern Med. 2015; 175(5):714-723. doi:10.1001/jamainternmed.2015.132.



Study: 4 Keys to Preventing Infections in NH residents

- New, multifaceted approach to reduce MDRO prevalence and incidence of infections in NHs²
 1. **Presumptive use of gown and gloves during daily care of all residents with indwelling medical devices (e.g., urinary catheters, feeding tubes)**
 2. **Active surveillance for MDRO colonization and infections**
 3. **Extensive educational curriculum for nursing staff**
 4. **Interactive hand hygiene education**
- Intervention resulted in a **23% reduction in MDRO prevalence among residents with indwelling catheters** (6 intervention homes compared with 6 usual care homes)
- Additionally, residents in the intervention homes had:
 - significantly lower risk of MRSA acquisition (hazard ratio, 0.78; $P = .01$)
 - fewer clinically diagnosed catheter-associated urinary tract infections (hazard ratio, 0.54; $P = 0.04$)

²Mody L, et al. A targeted infection prevention intervention in nursing home residents with indwelling devices. A randomized clinical trial. *JAMA Intern Med.* 2015;175(5):714-723.

Table 1. Overview of Targeted Infection Prevention (TIP) Program Interventions

Variable	Intervention Group (TIP)	Control Group (Usual Care)
Precautions		
Enrolled residents (with urinary catheter and/or feeding tube)	Preemptive barrier precautions Glove and gown use for direct care Transmission-based precautions as needed per NH policy	Standard precautions Transmission-based precautions as needed per NH policy
Nonenrolled residents	Standard precautions Transmission-based precautions as needed per NH policy	Standard precautions Transmission-based precautions as needed per NH policy
Surveillance		
Multidrug-resistant organisms	Active surveillance Cultures collected at baseline, day 15, and then monthly, with data reported back to the facilities every month	Passive surveillance Cultures collected at baseline, day 15, and then monthly for outcome measurements only, with no reports given to the facilities
Infections	Infections identified by study definitions and reported back to the facilities every month, along with reminders of key strategies to prevent infections	Infections identified by study definitions for outcome measurements only, with no reports given to the facilities
Education		
NH staff	Hand hygiene promotion Posters, videos, Glo Germ gel (Glo Germ Company), pre-post cultures Interactive infection prevention modules; ten sessions for health care workers Infection surveillance pocket cards provided to nurse, nurse's aide, physician, and infection preventionist on resident enrollment Half-day miniconference on infection surveillance; each NH infection preventionist was invited to participate	Education provided as needed (eg, annual requirements, in response to state surveys or audits)

Abbreviation: NH, nursing home.

Targeted Infection Prevention (TIP) Intervention for MDROs

Discussion:

Implementation of a “**horizontal**” intervention, i.e., daily glove & gown use for all residents with indwelling devices (i.e., resident-centered) *vs.* implementation of a “**vertical**” intervention (i.e., pathogen-directed)

- This strategy aligns more closely with the fundamental principle of **Standard Precautions** (where risk of transmission is considered during care activities for every person, regardless of known infection or colonization status).
- Focus on resident risk factors rather than specific pathogen may help nursing homes ensure that appropriate practices are in place during care of the highest-risk individuals in the facility

For **questions** regarding information contained in this presentation, or any other CRE and/or MDRO concerns, please contact either the Antimicrobial Resistance/CRE coordinator or the NYSDOH regional epidemiologist in your area:

NYSDOH AR/CRE Coordinator:
rosalie.giardina@health.ny.gov

(914) 654-4362

Rosalie Giardina

Central Office (Albany):

(518) 474-1142

Capital District Regional Office:

(518) 474-1142

Central New York Regional Office:

(315) 477-8166

Metropolitan Area Regional Office:

(914) 654-7149

Western Regional Office:

(716) 847-4503



