

Long Beach CRE Collaborative

Anissa Davis, MD, MPH

City Health Officer

Long Beach Department of Health and Human Services

March 13, 2018

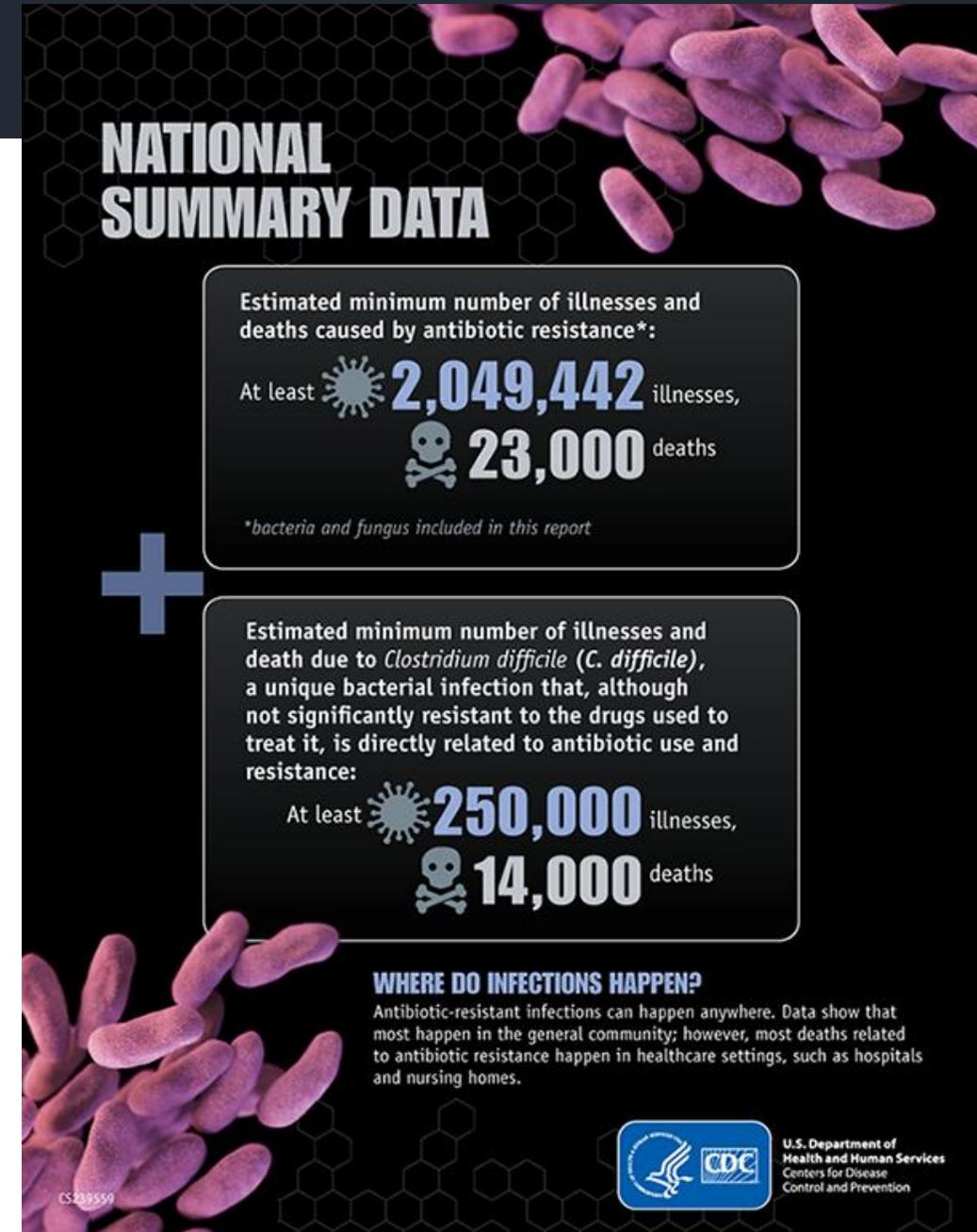


LONG BEACH
HEALTH & HUMAN SERVICES



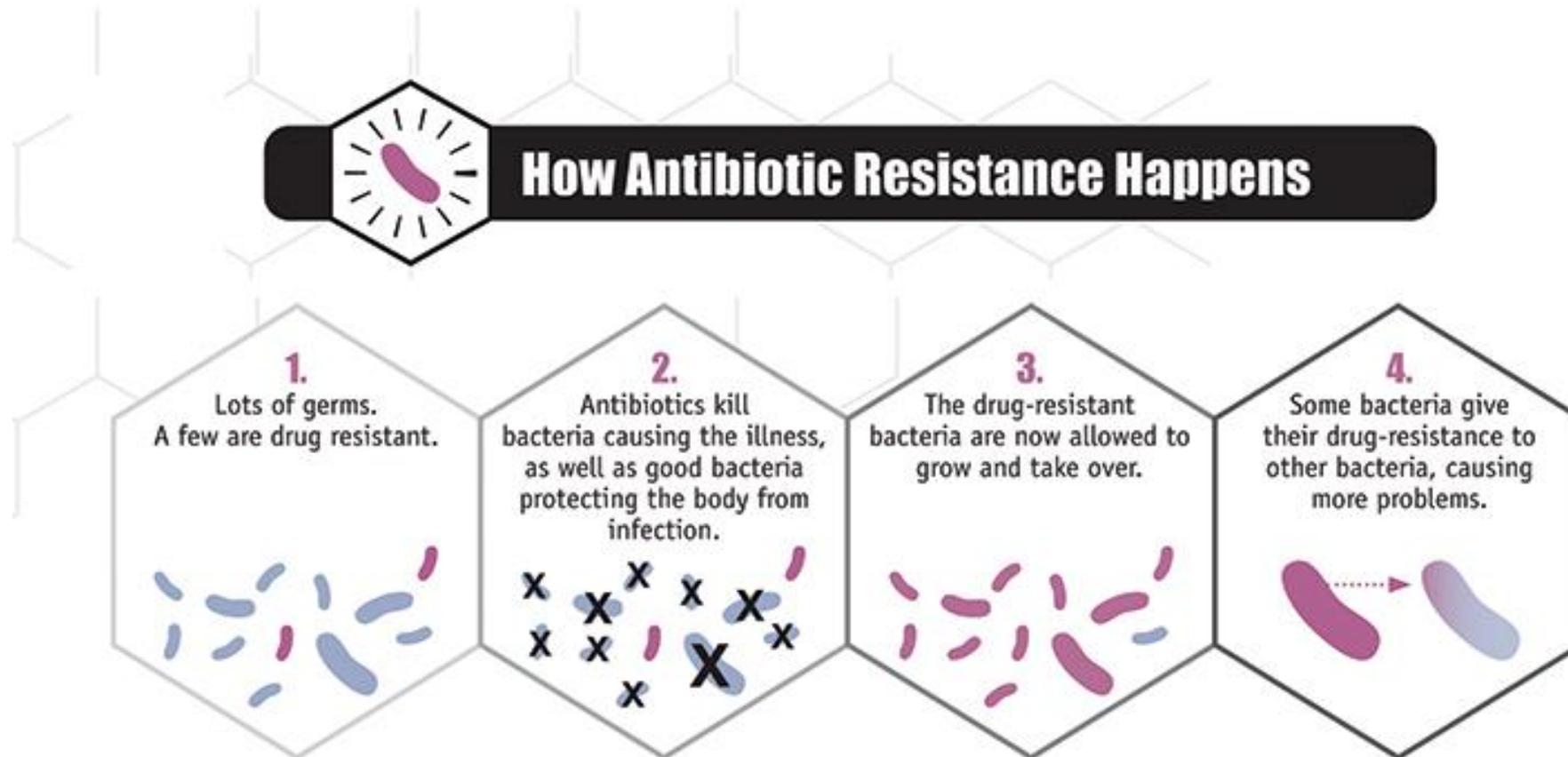
Antibiotic Resistance

- › Each year, over 2 million illnesses and 23,000 deaths are caused by antibiotic resistance
- › Most of these deaths happen in healthcare settings, including hospitals and nursing homes





Antibiotic Resistance





Antibiotic Resistant Infections

- › Resistant infections can cause severe illness. People with these infections:
 - › May be more likely to be hospitalized and have higher medical expenses
 - › May take longer to get well again
 - › May die from the infection

The Miami Herald
50 CENTS 107TH YEAR, NO. 19 (2010) MiamiHerald.com MONDAY, JAN. 11, 2010 FINAL EDITION

WHEN DRUGS STOP WORKING
The most lethal infectious diseases on the planet are mutating at an alarming rate worldwide. The reason: Overuse and misuse of the drugs that were supposed to save us.

Groups must repay 'dirty money'
Millions of dollars in donations made to about 30 local charities by Scott Rothstein's firm are being clawed back.

THE WEEK-AHEAD IN THE KNOW
MONDAY
BALLOON BOY'S DAD OFF TO JAIL
Richard Herrin begins his 90-day sentence for the Oct. 15 hoax.

TUESDAY ELECTION DAY
Miami voters will head to the polls in a special election to fill two seats that have been vacant for two months — one in District 1, which covers most of Allapattah, and one in District 5, which runs from Overtown to Liberty City.

AMERICAN IDOL
The hit show starts its ninth season with the traditional audition round, which will run on Tuesdays and Wednesdays at 8 p.m. on FOX through Feb. 3.

GLOBAL TRADE NUMBERS
The Commerce Department will release international trade figures for November. They are expected to be down for South Florida.

WEDNESDAY

A 'TUBE BOMB': Tuberculosis and HIV patient Vancherkum Maharatnasing, 35, looks out from the isolation ward in Thailand. TB has learned to fight back against drugs, mutating into a tougher strain for which few medications exist.

BY MARGE MASON AND MARTHA MENDOZA
Associated Press
LANTANA — It started with a cough, an autumn back

gious, aggressive, especially drug-resistant form of tuberculosis. The Associated Press learned of his case, which until now has not been made

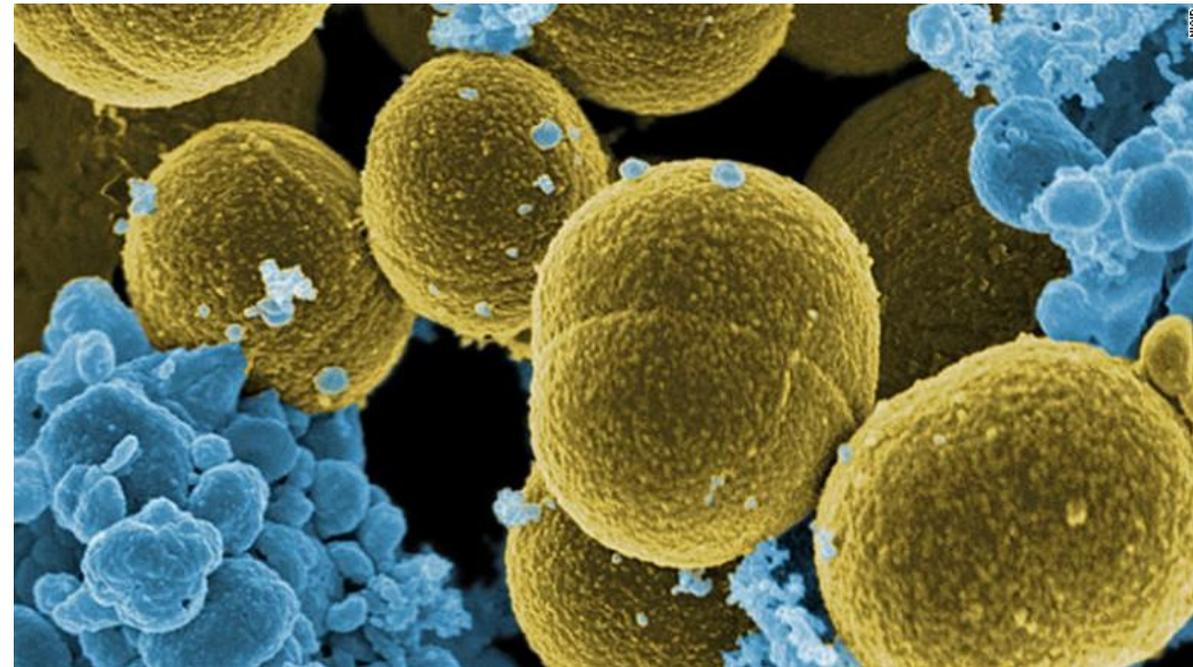
BY DANIEL CHANG
chang@miamiherald.com
More than \$2 million in donations doled out by disbarred attorney Scott Rothstein have come back to haunt many of the South Florida charities and nonprofits that once counted on the largesse of the alleged fraudster. Hospitals, schools, charities benefiting children, battered women and religious groups all received donations from Rothstein over the past year — a period when nonprofits struggled to stay afloat amid the economic recession. While many groups have returned Rothstein's donations voluntarily, others have already spent the money, and at least one risks losing nearly \$1.5 million in federal matching grants. Barbara Weinstein, chief executive of Family Central, said nearly 11,000 children in



Antibiotic Resistant Infections

› Examples:

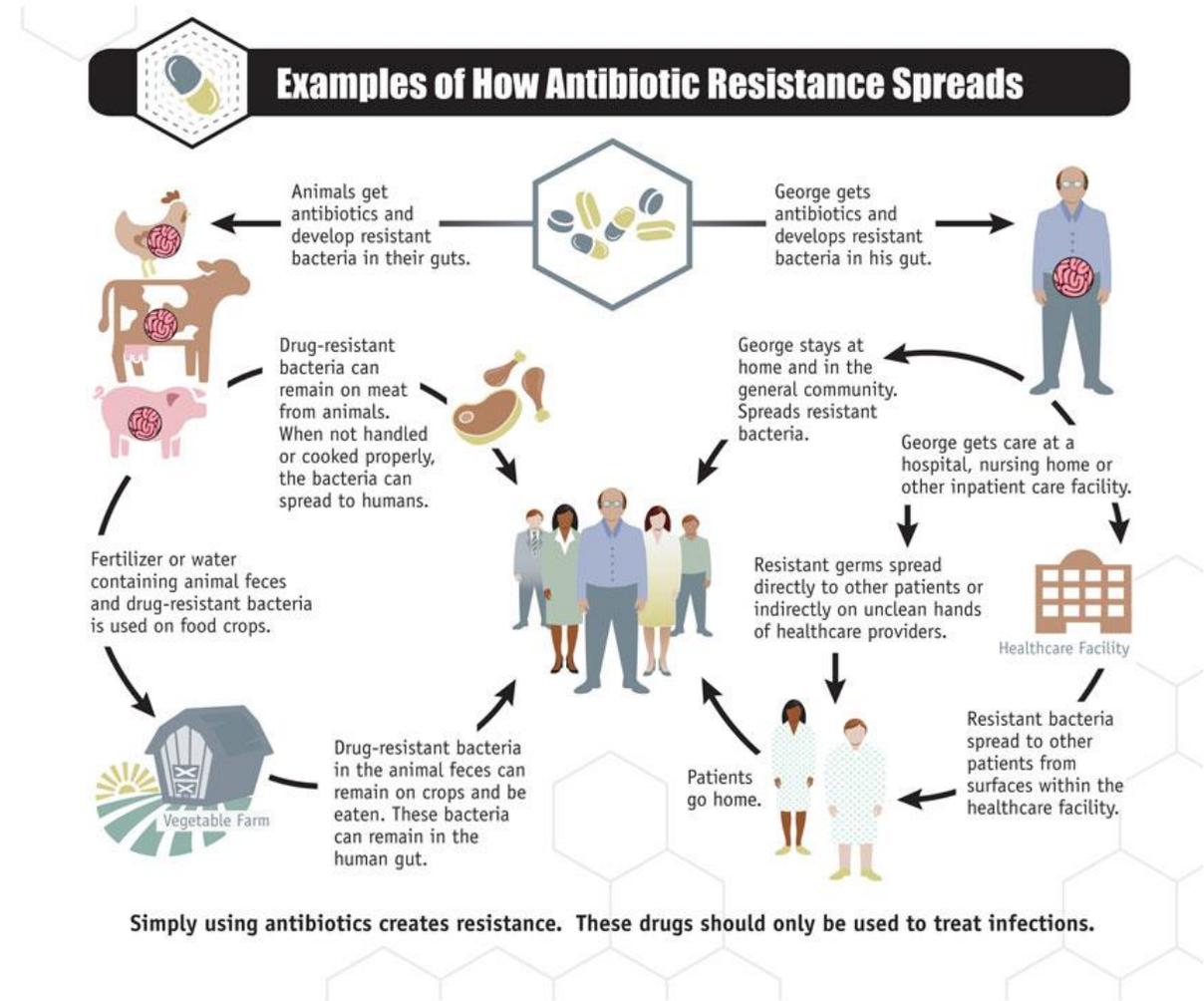
- › Methicillin resistant *Staph aureus* (MRSA)
- › Vancomycin resistant *Enterococcus* (VRE)
- › Multi-drug resistant *Acinetobacter*
- › Carbapenem resistant *Enterobacteriaceae* (CRE)





Antibiotic resistance continues to increase...

1. Overuse/abuse
2. Inappropriate prescribing
3. Extensive agricultural use
4. Availability of few new antibiotics





Overuse and Misuse of Antibiotics

- › Improper use of antibiotics can lead to resistant organisms
- › Antibiotics are the most commonly prescribed drugs used in human medicine
 - › Up to 50% of antibiotics are not prescribed appropriately, or with incorrect dosing/duration





Inappropriate Prescribing

- › Antibiotics are the most commonly prescribed drugs used in human medicine
 - › Up to 50% of antibiotics are not prescribed appropriately, or with incorrect dosing/duration
 - › Up to 60% of patients don't take as prescribed; don't finish the course
 - › 30%-60% of antibiotics prescribed in ICUs have been found to be unnecessary, inappropriate, or suboptimal.

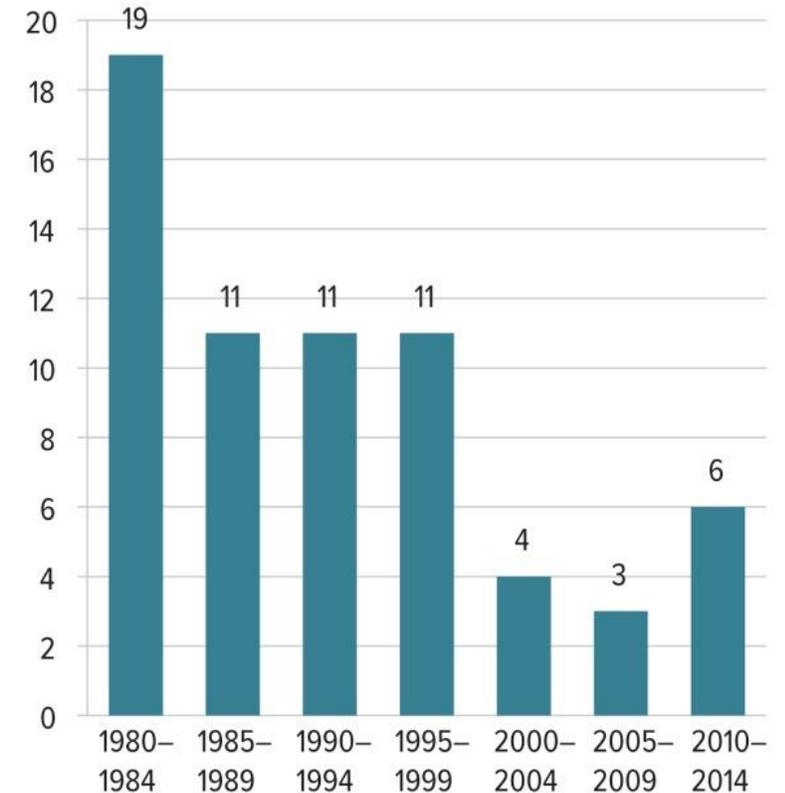




Availability of Few New Antibiotics

- › Antibiotic development no longer a good investment for pharm industry
 - › Medicines for chronic diseases make more money than antibiotics (max \$1,000 x course vs >\$10,000)
 - › Antibiotics often only used for short periods, whereas drugs for chronic diseases may be used for a lifetime

Figure 3 Number of Antibacterial New Drug Application Approvals Versus Year Intervals



The number of new antibiotics developed and approved has decreased steadily over the past three decades (although four new drugs were approved in 2014), leaving fewer options to treat resistant bacteria.

* Drugs are limited to systemic agents. Data courtesy of the CDC⁵ and the FDA Center for Drug Evaluation and Research.



Personal Story



- › January 2017, Nevada woman died of a strain of CRE that was resistant to all 26 antibiotics available in the US
- › Became infected with carbapenem-resistant *Klebsiella pneumoniae* while in a hospital in India – there for broken leg
- › Had several hospitalizations in India in June 2016 (CRE is more common)
- › Pt died in September 2016 in a Reno hospital
- › Expecting to see more cases like this as resistance and travel increase



Implications of CRE

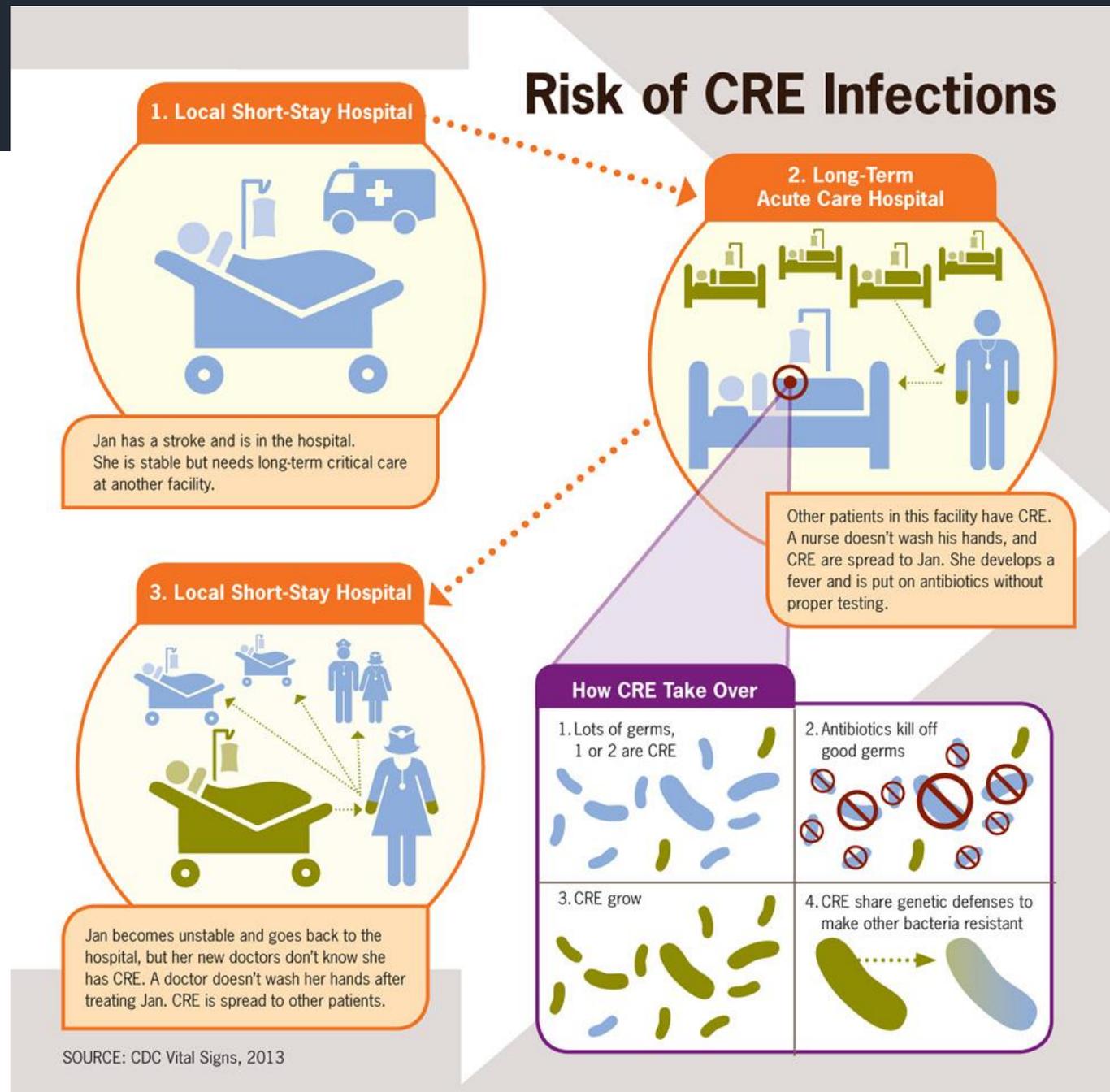
- › Spread easily in healthcare settings
- › Longer hospital stays
- › More costly for patient
- › More costly for the facility
(median cost of 1 CRE infection between \$22,000 and \$66,000)
- › More likely to end in death





Every Facility Plays a Part

- › Patients often transferred to multiple facilities throughout illness/injury
- › Lack of proper precautions can cause CRE to spread at ALL facilities
- › Poor communications among facilities can lead to greater spread of CRE





What are we doing in Long Beach?

- › Going back to basics
 - › Handwashing
 - › Isolation
 - › Cohorting
 - › Proper use of PPE
 - › Reporting



The screenshot shows the website for Long Beach Health & Human Services. The page title is "CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CRE)". The breadcrumb trail is: Home » Health » Diseases & Condition » Resources For Providers » Carbapenem-Resistant Enterobacteriaceae CRE. The main content includes a "CRE REPORTING FORM" link, a paragraph defining CRE as *Enterobacteriaceae* (*Klebsiella sp.*, *E. coli*, and *Enterobacter sp.*) resistant to carbapenem antibiotics, and a news release from January 19, 2017, regarding a city health officer's order for reporting CRE. Other links include "CRE Health Officer Order" and "CRE Facility Notification". A footer note directs users to the CDC website for more information on CRE.



CRE Reporting

Effective January 12, 2017, the Long Beach City Health Officer mandated that all acute care hospitals and skilled nursing facilities in Long Beach report carbapenem-resistant *Enterobacteriaceae*.

- › What it means:
 - › All acute care hospitals and SNFs must report CRE from any specimen source, either by reporting into NHSN or by submitting a Confidential Morbidity Report along with lab
 - › Facilities are required to submit an annual antibiogram



LONG BEACH
HEALTH & HUMAN SERVICES

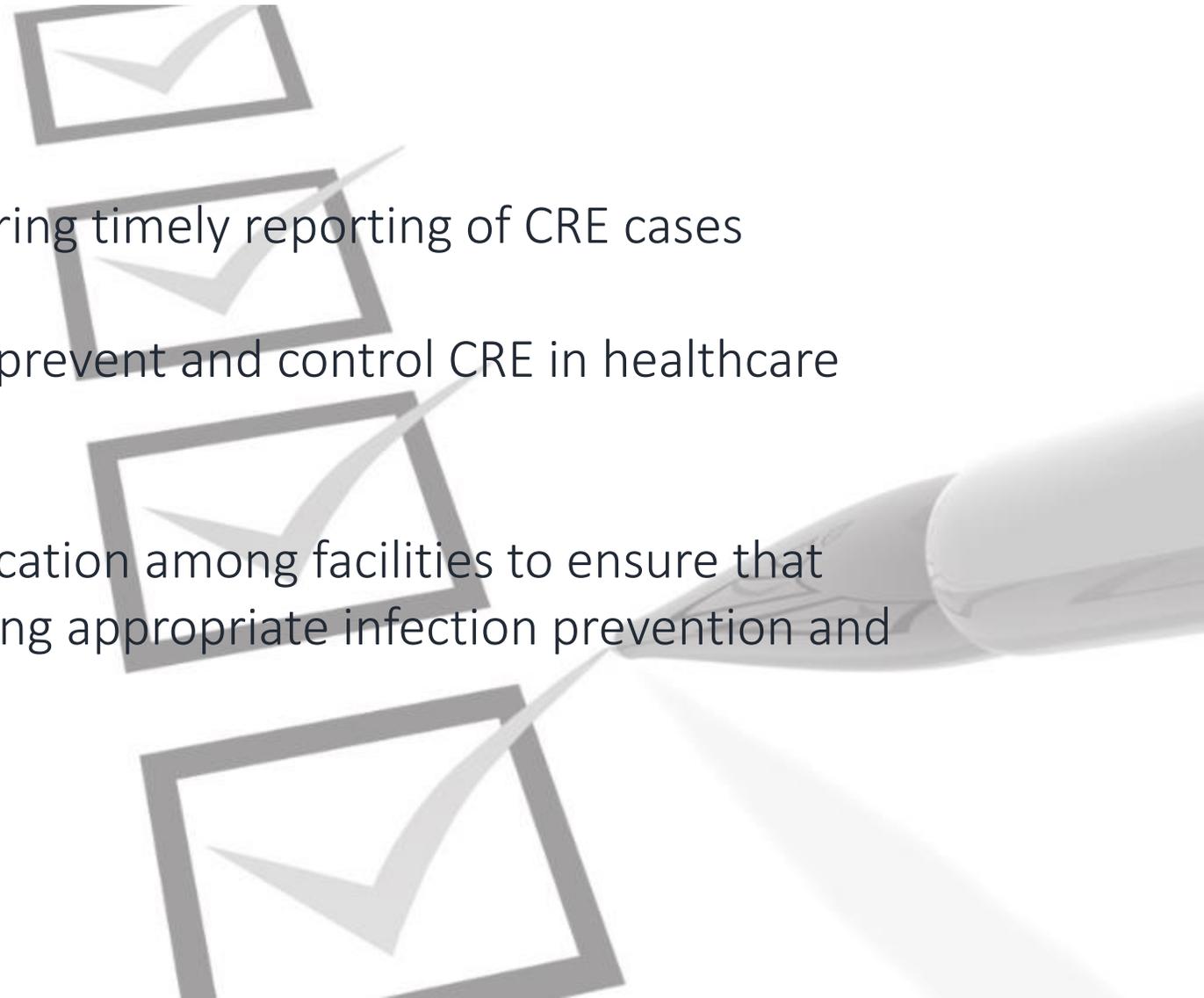
CRE Collaborative

Year-long (March 2018 – March 2019) collaborative with acute care hospitals, skilled nursing facilities, Long Beach Department of Health, and CDPH



CRE Collaborative Objectives

1. Improve surveillance efforts by ensuring timely reporting of CRE cases
2. Increase knowledge and capacity to prevent and control CRE in healthcare facilities throughout Long Beach
3. Enhance coordination and communication among facilities to ensure that patients with CRE are transferred using appropriate infection prevention and control precautions





CRE Collaborative Structure

- › Assessments
 - › Baseline self-assessments
 - › Observational assessments
 - › Final self-assessment
- › Quarterly learning and discussion sessions
 - › Identifying and tracking CRE, prevention strategies, inter-facility communication, etc
- › Meetings and Conference Calls
 - › Checking in, sharing what worked and what didn't





CRE Collaborative Expectations

- › Actively engage all CRE team members by ensuring participation in all collaborative activities (e.g. observational assessment, learning and discussion sessions, etc.)
- › Commit to a prevention action plan and participate in a one-time onsite prevention assessment
- › Conduct and share information regarding CRE surveillance





Questions?

Carbapenem-resistant Enterobacteriaceae (CRE)- Question and Answer

Sam Horwich-Scholefield MPH CIC
Long Beach, CA
March 13th 2018

Objectives

1. Understand the scope and significance of carbapenem resistant Enterobacteriaceae (CRE)
2. Describe the factors that contribute to CRE transmission and CRE incidence
3. Understand the basis for infection prevention and antimicrobial stewardship interventions to reduce CRE
4. Identify opportunities for CRE prevention across the continuum of care

1. What are Enterobacteriaceae?

1. Enterobacteriaceae are ...

- **Gram negative bacteria that are a normal part of human gut flora**
 - *Citrobacter* spp., *E. coli*, *Enterobacter* spp., *Klebsiella* spp., *Morganella* spp., *Proteus* spp.
- **Causative agents of various infections**
 - UTI, wound infections, pneumonia, bacteremia
- **Important causes of community and healthcare-associated infections, including outbreaks**

2. What are carbapenem resistant Enterobacteriaceae (CRE)?

2. CRE are Enterobacteriaceae that are...

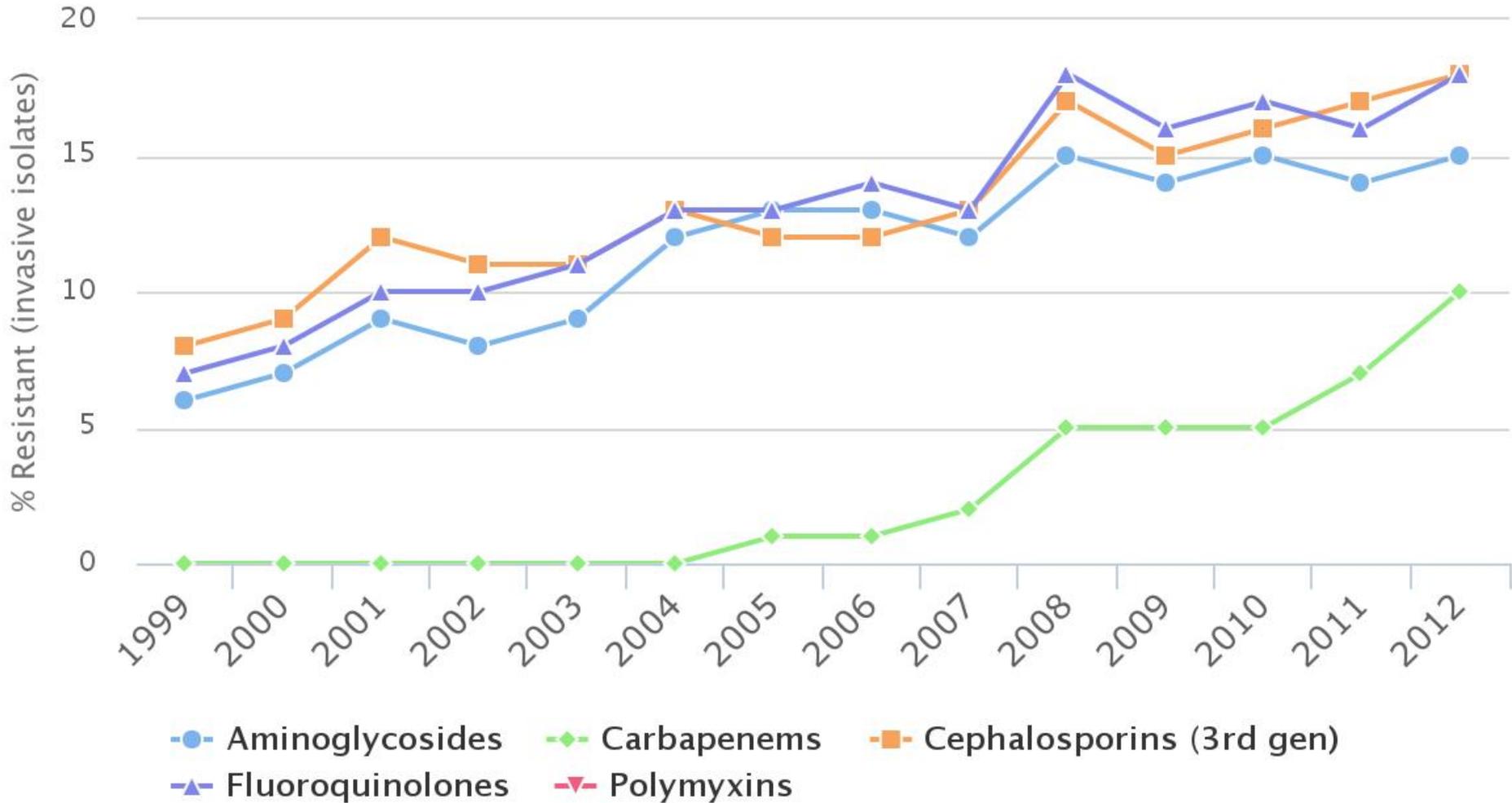
- **Resistant to carbapenems**, a broad spectrum class of antibiotics used as a last resort for some infections
- **Associated with healthcare exposures**, including overnight stays at healthcare facilities, recent history of antibiotic use, and presence of indwelling medical devices

3. Are CRE a problem?

3. CRE are an urgent threat to patient safety and public health

- CRE are often **resistant to multiple classes of antibiotics** and are difficult to treat
 - Invasive infections result in 40-50% mortality
- **Prevalence has increased dramatically** in the United States since early 2000s
- Considered by CDC to be one of the **top 3 most urgent antibiotic resistant threats**

Antibiotic Resistance of *Klebsiella pneumoniae* in United States

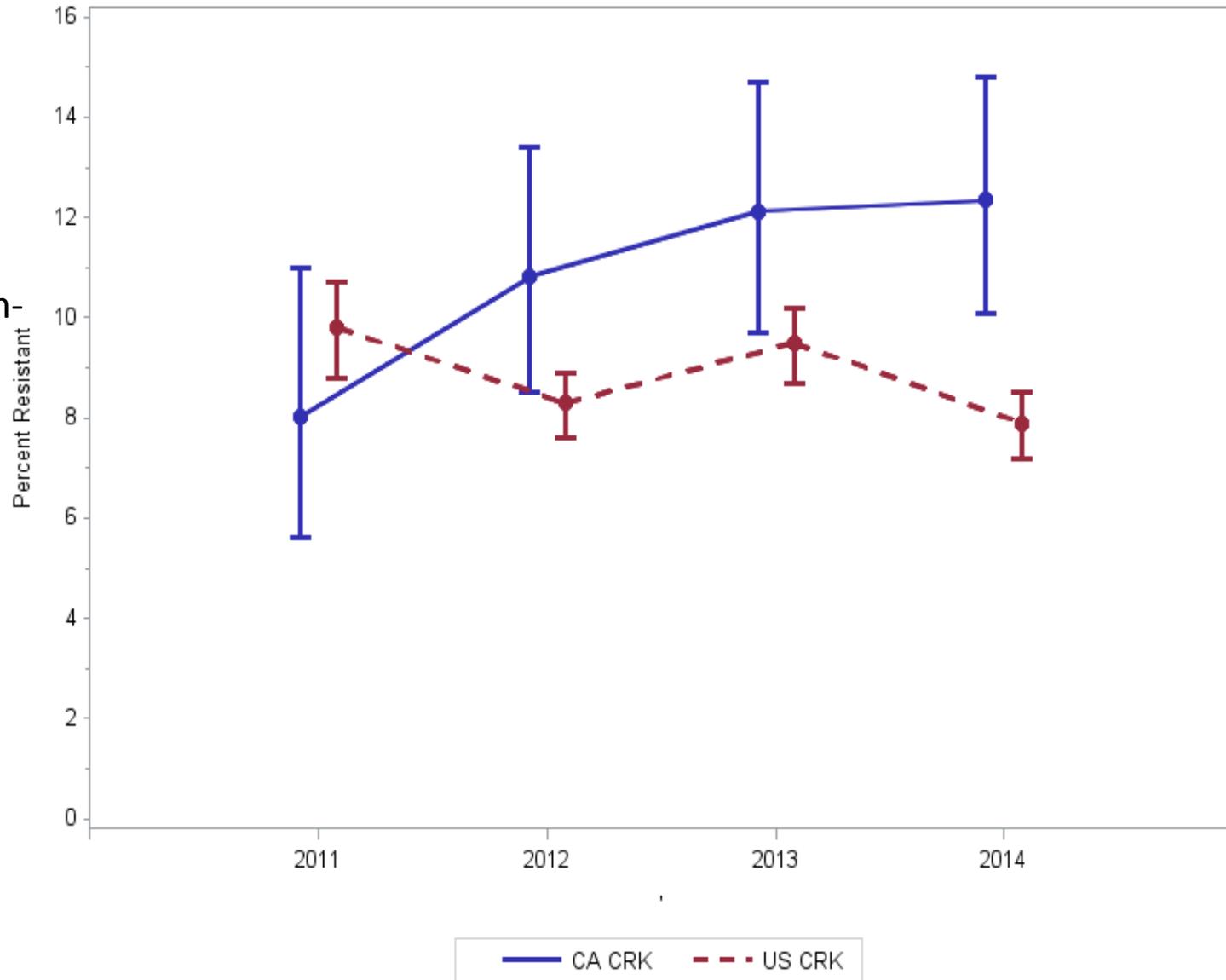


Carbapenem Resistance in *Klebsiella* spp. Among HAI, California vs. U.S., 2011-2014

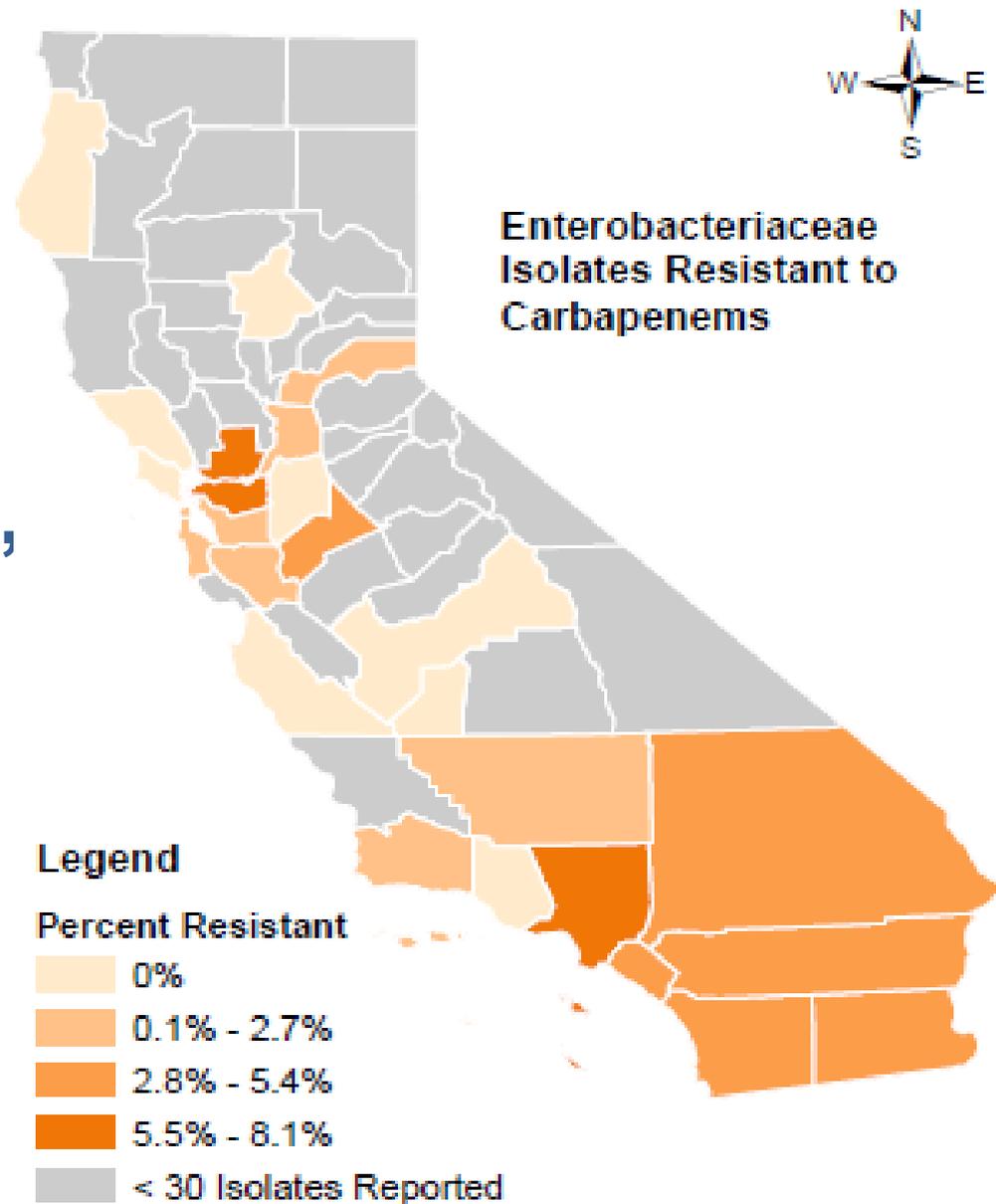
— California Carbapenem-Resistant *Klebsiella* spp.

- - - U.S. Carbapenem-Resistant *Klebsiella* spp.

Source: CDC National Healthcare Safety Network

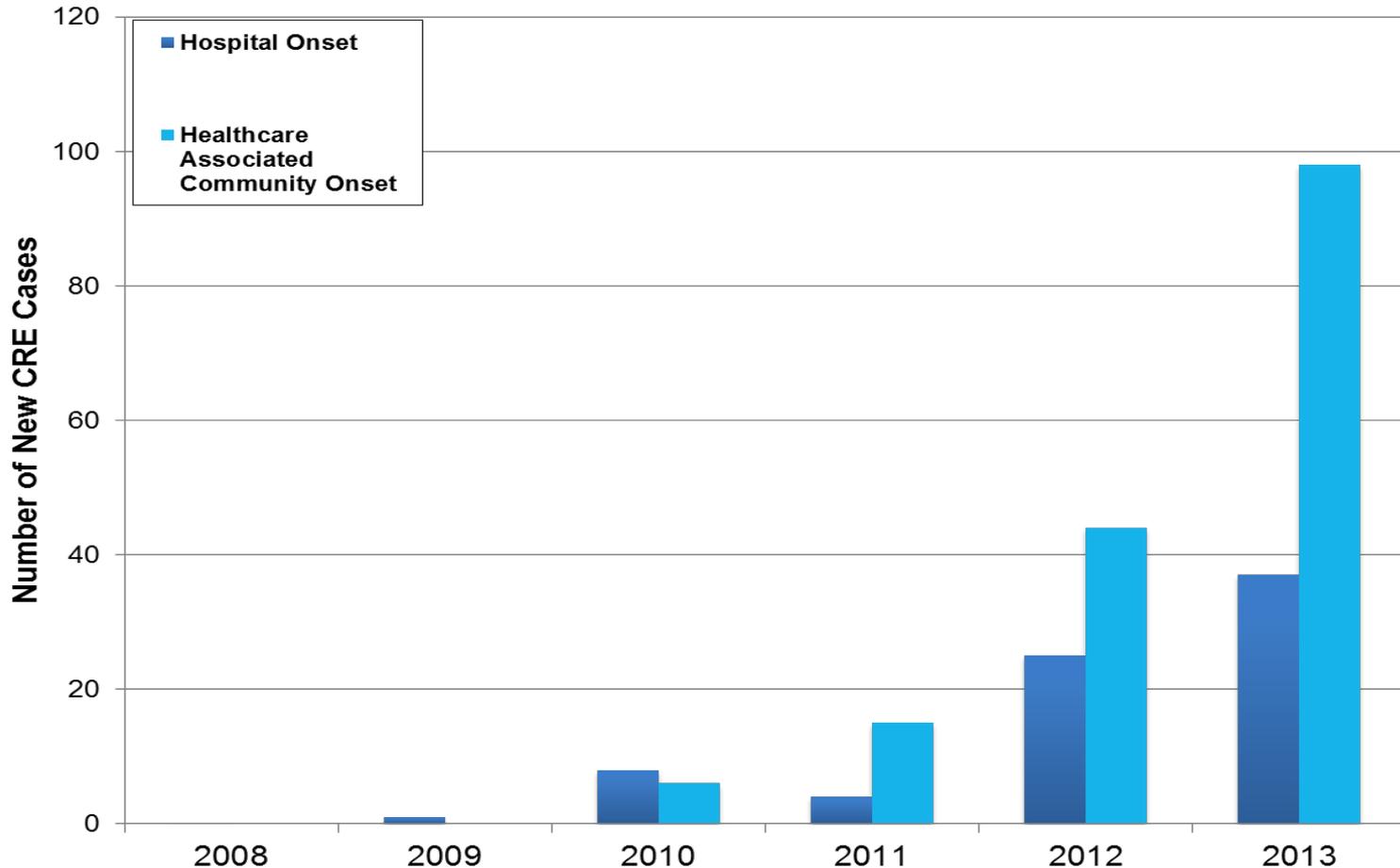


Percentage CRE Among HAI Reported to NHSN, 2014-2015, California Acute Care Hospitals (N=342)



CRE Trends in Orange County CA

Hospital and Healthcare-Associated Community
Onset CRE Incidence
(N = 21 Hospitals)



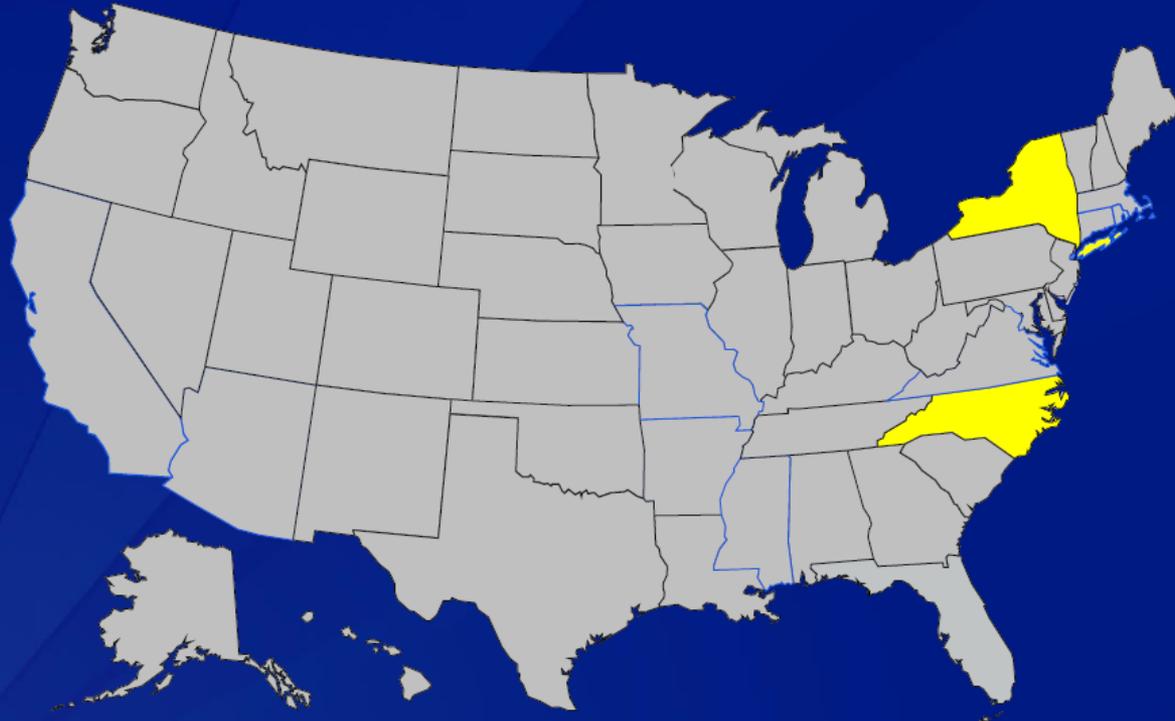
Gohil S. IDWeek, 2014; Slide courtesy of Susan Huang, UC Irvine

4. What makes certain Enterobacteriaceae resistant to carbapenems?

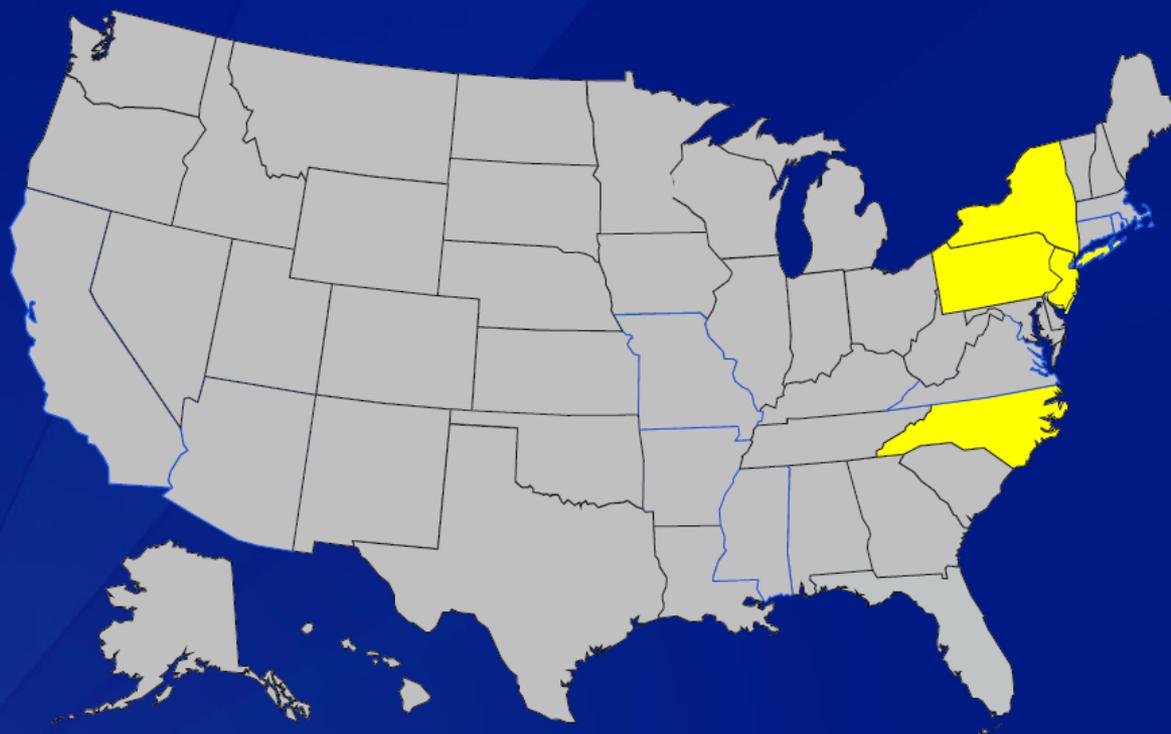
4. Antibiotic use and transmission of resistance genes

- Exposure to multiple different antibiotic classes associated with risk of CRE
- Different types of CRE
 - Carbapenemase-producing (CP) CRE
 - Make enzymes that inactivate carbapenems
 - KPC, NDM, VIM, IMP, OXA, and others
 - **Carbapenemase genes be transmitted between bacteria → potential for widespread transmission of carbapenem resistance**
 - Non-carbapenemase producing (non-CP) CRE

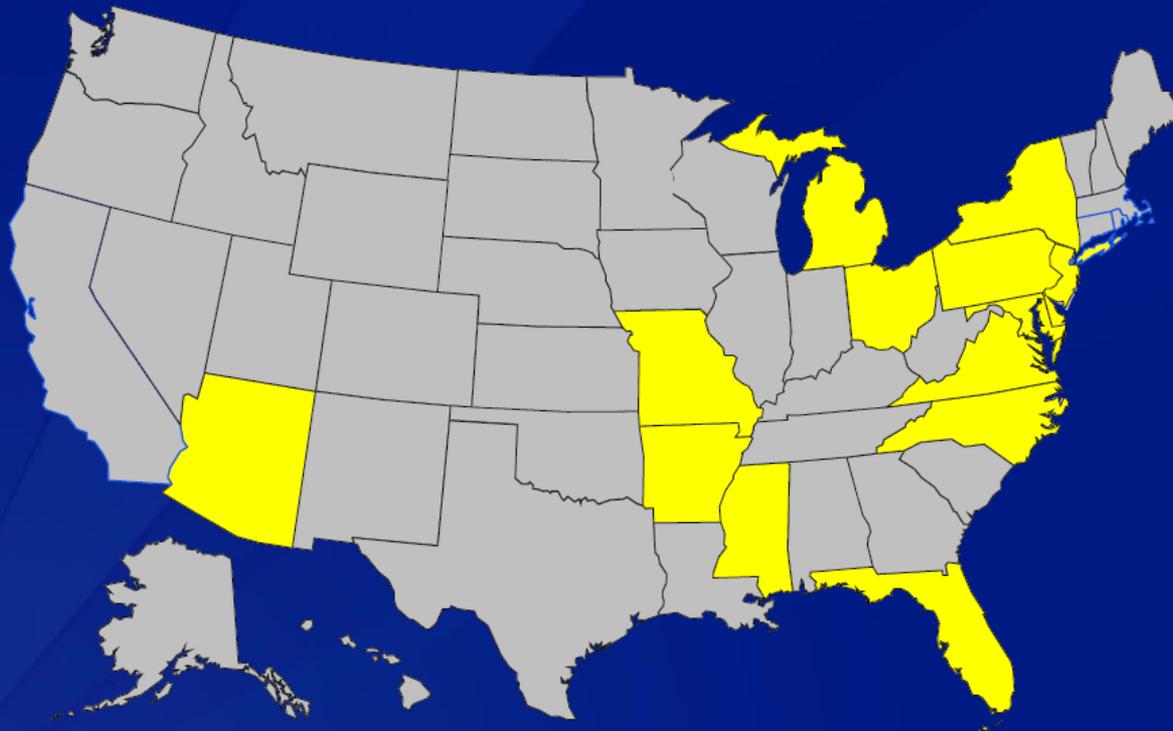
Geographical Distribution of KPC- Producers 2001



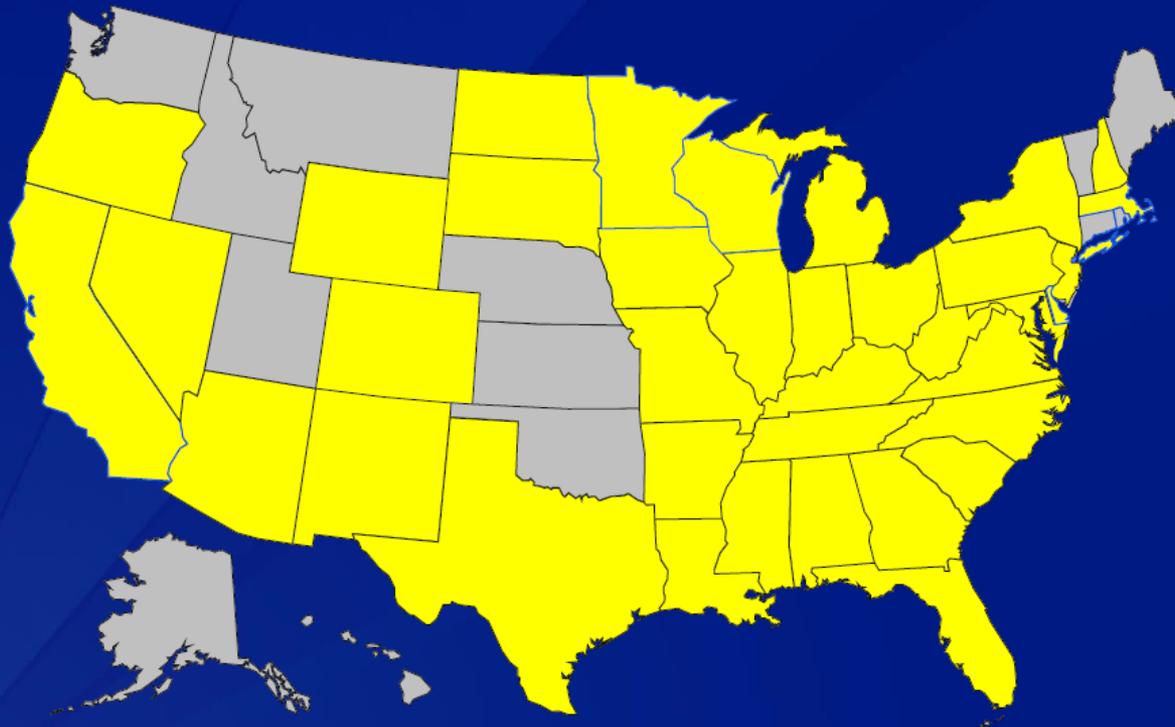
Geographical Distribution of KPC- Producers 2005



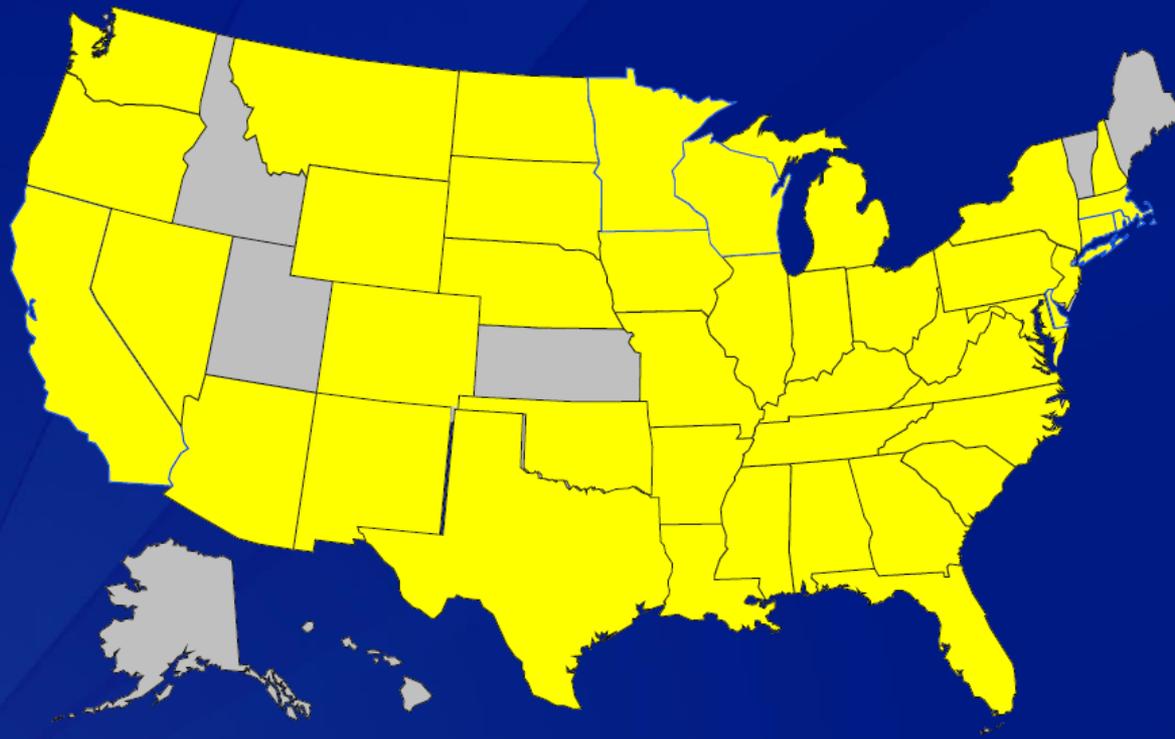
Geographical Distribution of KPC- Producers 2006



Geographical Distribution of KPC- Producers 2012



Geographical Distribution of KPC- Producers 2014



5. How do we identify CRE in a patient?

5. Patients can be infected or colonized with CRE

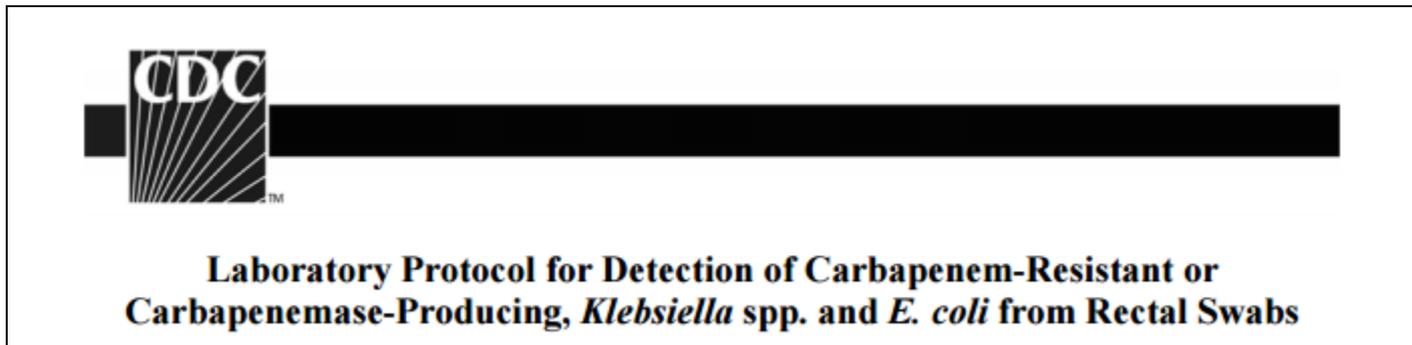
- Patients can be colonized with CRE without signs/symptoms of infection
 - CRE colonized patients can still contaminate environment and healthcare worker hands/clothing, leading to transmission

Two ways to detect CRE

- **Clinical cultures** collected to evaluate for infection
 - Fail to identify one third to one half of patients with CRE
- **Surveillance cultures** identify patients who are colonized with CRE
 - Identify between 70-80% of colonized patients
 - Enable infection prevention measures to be implemented for colonized patients and prevent transmission

Identifying CRE Colonization

- Surveillance cultures of rectal swabs
 - Identify patients colonized with CRE in the intestinal tract
 - Further testing is needed to distinguish CP-CRE from non-CP CRE
- CDC published a laboratory protocol to specifically screen for carbapenem resistant bacteria



http://www.cdc.gov/HAI/pdfs/labSettings/Klebsiella_or_Ecoli.pdf

6. What tests can be used to identify and distinguish CP-CRE from non-CP CRE?

6. Antimicrobial susceptibility testing identifies carbapenem resistance, but doesn't distinguish between CP and non-CP CRE

1. Phenotypic Tests

- Can tell you if a carbapenemase is present, but not which kind
 - Modified Hodge Test, Carba-NP

2. Molecular Tests

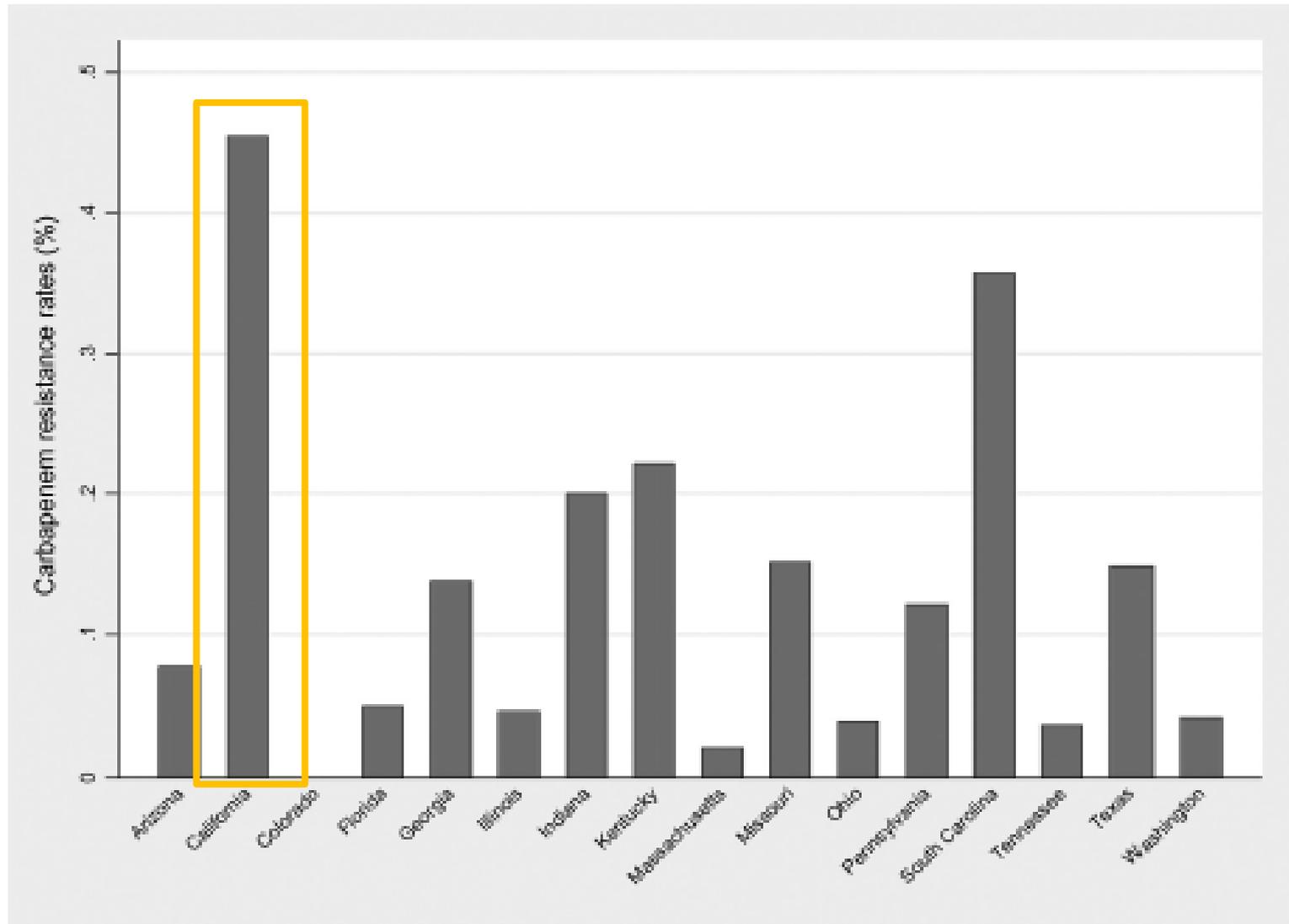
- Can identify which kind of carbapenemase is present
 - PCR-based tests
 - Whole genome sequencing

7. What are the major risk factors for CRE?

7. Risk factors for CRE infection and colonization include:

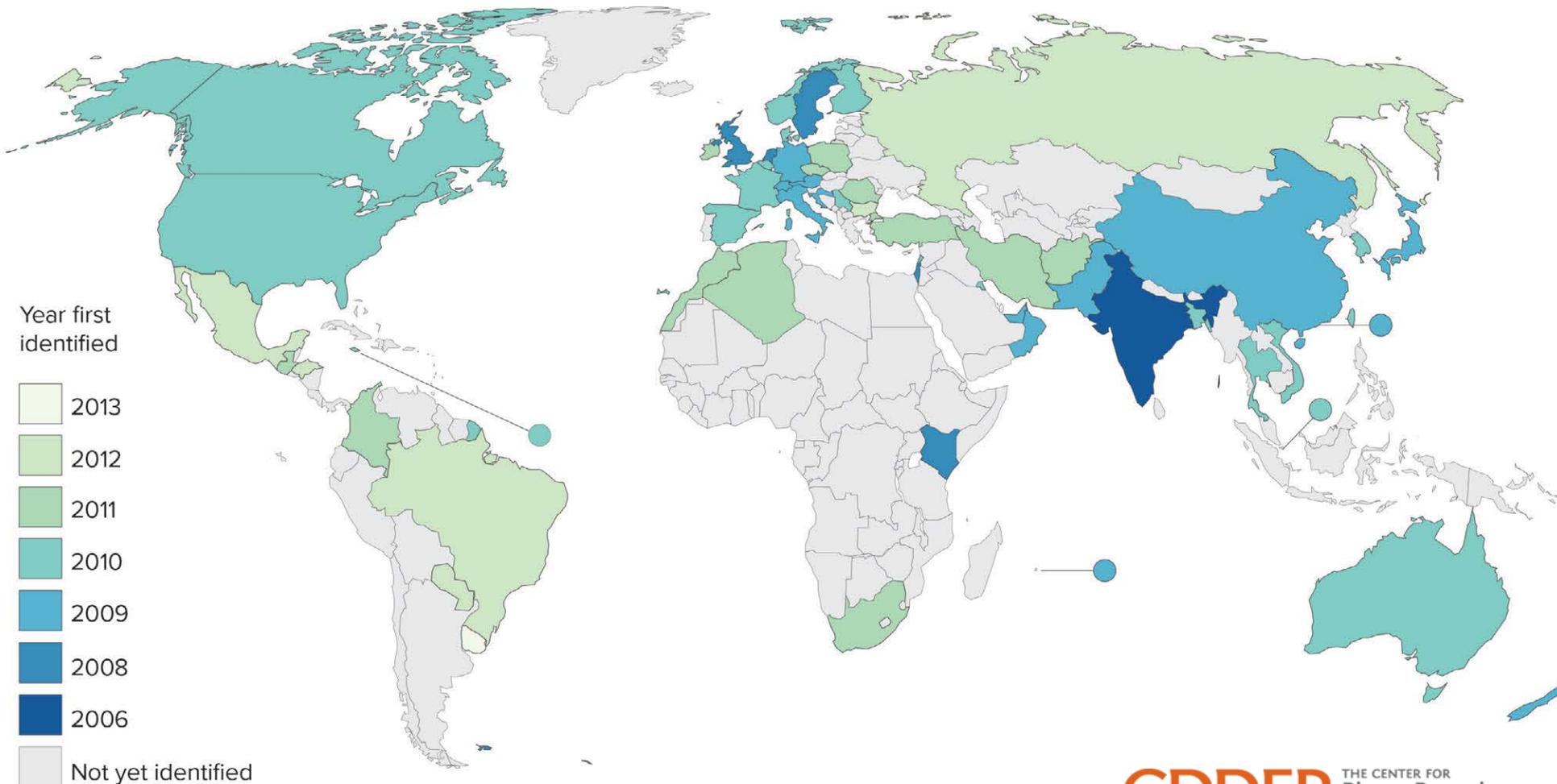
- Extensive antibiotic use
- Poor functional status
- Presence of indwelling medical devices; receipt of mechanical ventilation
- Recent stay at a long-term acute care (LTAC) hospital
- Healthcare exposures outside the U.S.

Carbapenem-resistant *K. pneumoniae* in Long Term Acute Care Hospitals



Han et. al Clin Infect Dis (2017) 64 (7): 839-844.

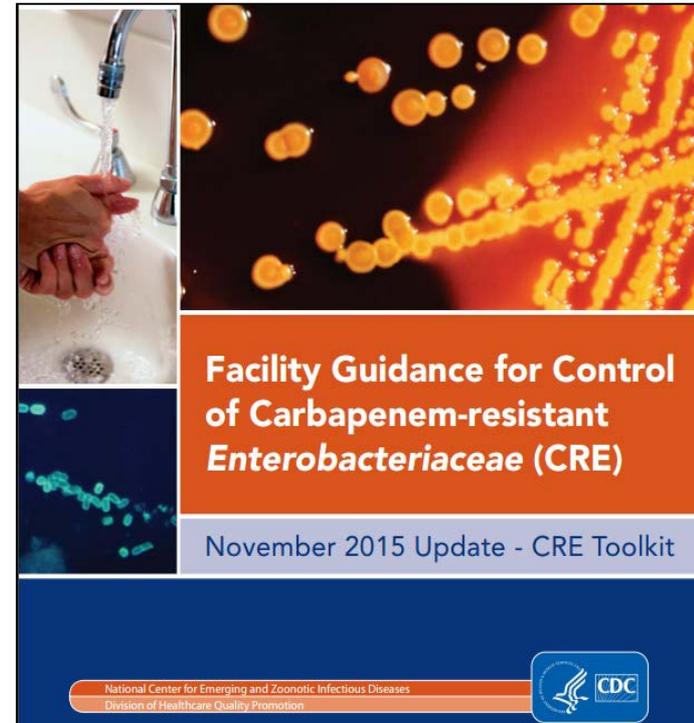
New Delhi metallo-beta-lactamase (NDM)– producing CRE



8. What are the strategies to prevent CRE?

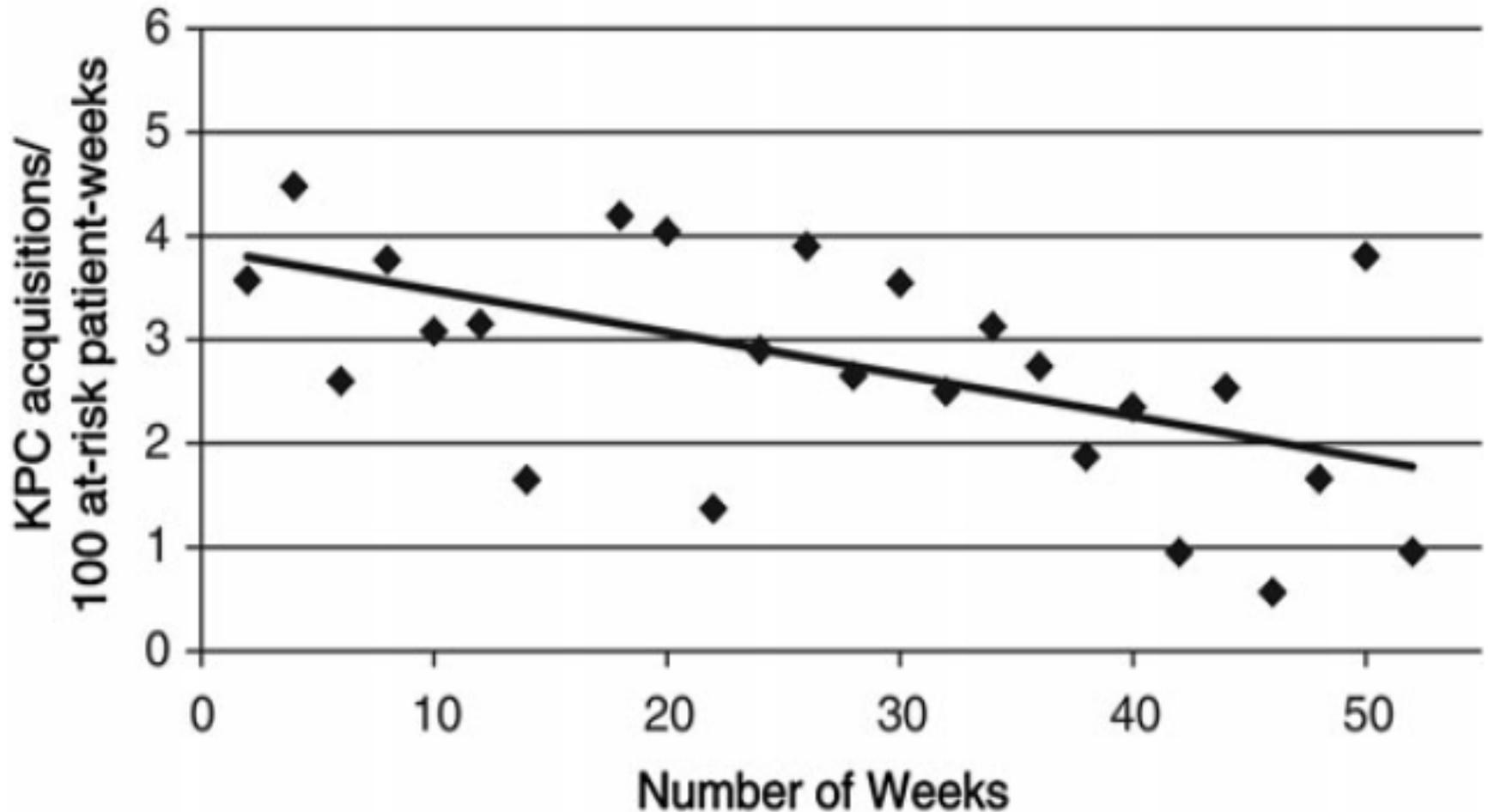
8. CDC CRE Toolkit Prevention Strategies

1. Hand Hygiene
2. Contact Precautions
3. Healthcare Personnel Education
4. Minimize Device Use
5. Rapid Laboratory Notification
6. Interfacility Communication
7. Antimicrobial Stewardship
8. Environmental Cleaning
9. Patient and Staff Cohorting
10. Screening Contacts of CRE Patients
11. Active Surveillance Testing
12. Chlorhexidine Bathing



Specific CRE prevention strategies will be addressed throughout the Collaborative

Infection control interventions can reduce CRE transmission



A bundled approach reduced incidence of CRE colonization by half

- **Screening patients for CRE upon admission**
- **Semi-monthly surveillance cultures**
- **Contact isolation and cohorting of CRE colonized and infected patients**
- **Daily chlorhexidine bathing**
- **Adherence monitoring**
- **Healthcare worker education**

9. How is the application of CRE prevention strategies different in acute care versus skilled nursing facilities?

9. Adapting CRE Prevention in Skilled Nursing Facilities

- While caring for residents with CRE in a skilled nursing facility, recognize:
 - Residents may be admitted for prolonged periods
 - Infection control measures need to allow for resident mobility and socialization needs
- CRE prevention strategies should be based on resident's
 - Clinical and functional status
 - Risk of transmitting CRE
 - Transmission risk depends on degree to which resident might contaminate their environment or HCW

CRE Transmission Risk Assessment for Skilled Nursing Facility Residents

Higher Transmission Risk	Lower Transmission Risk
<ul style="list-style-type: none"> • Functional Level <ul style="list-style-type: none"> – Totally dependent on assistance for activities of daily living (ADLs) – Cognitively unable to maintain personal hygiene 	<ul style="list-style-type: none"> • Functional Level <ul style="list-style-type: none"> – Able to dress, eat, bathe, toilet, transfer, walk, groom with minimal assistance – Cognitively able to maintain personal hygiene
<ul style="list-style-type: none"> • Presence of indwelling devices (urinary catheter, feeding tube, tracheostomy tube, vascular catheters) 	<ul style="list-style-type: none"> • No indwelling devices
<ul style="list-style-type: none"> • Ventilator-dependent 	<ul style="list-style-type: none"> • Not ventilator-dependent
<ul style="list-style-type: none"> • Wounds 	<ul style="list-style-type: none"> • No wounds
<ul style="list-style-type: none"> • Incontinence of stool and/or urine 	<ul style="list-style-type: none"> • Continent of stool and urine

Adapting CRE Prevention in Skilled Nursing Facilities

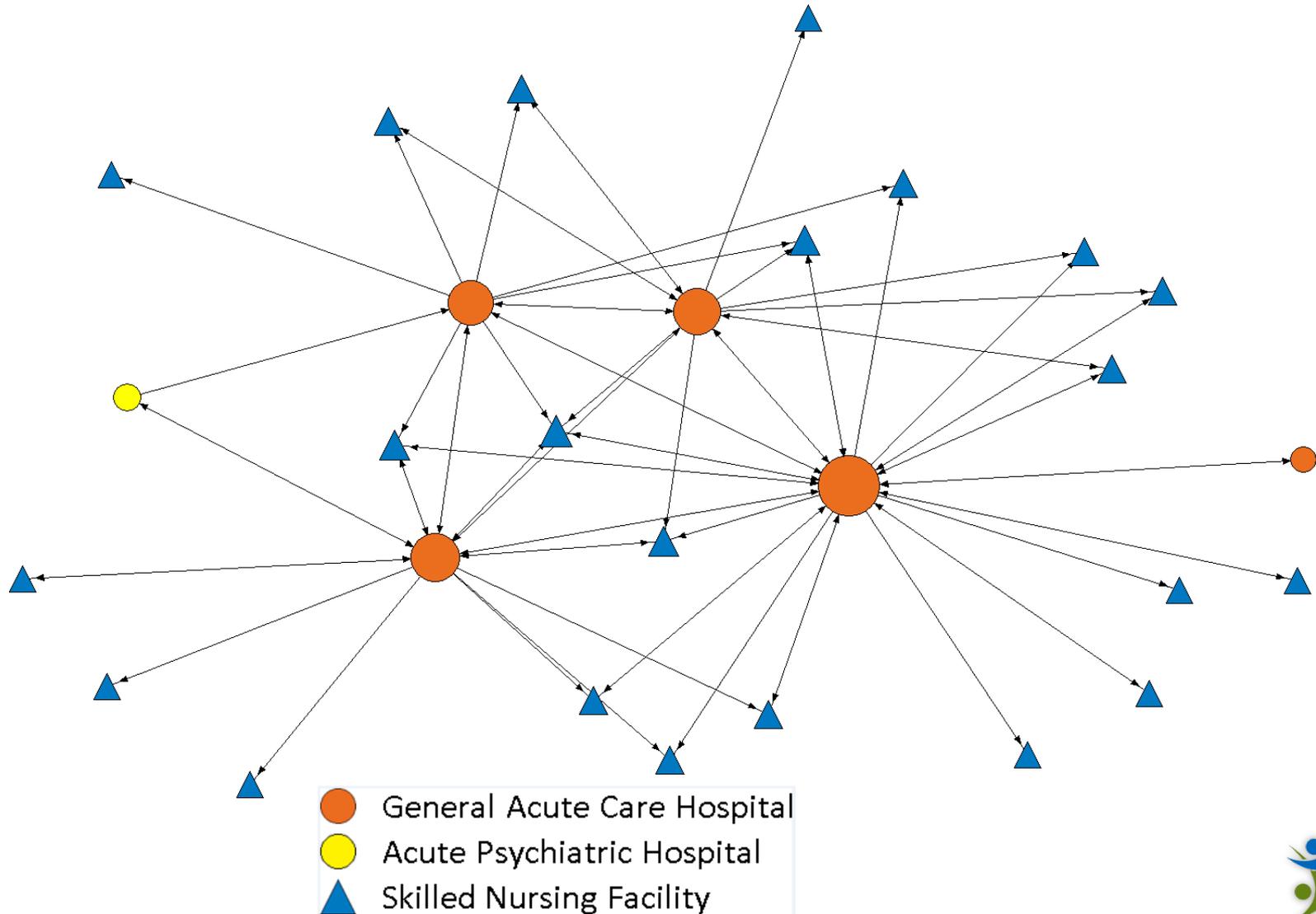
- **Contact precautions** for CRE colonized or infected residents at higher risk for **CRE transmission**
 - Single room preferred
 - If limited, reserve for those with highest risk for transmission
- Contact precautions may **not** be necessary for lower risk CRE colonized residents

Adapting CRE Prevention in Skilled Nursing Facilities

- **Standard precautions should always be observed.**
 - Gloves and/or gowns when contact with body fluids is possible
 - Bathing
 - Assisting with toileting
 - Changing briefs
 - Changing wound dressings
 - Manipulating devices

**Why are we using a
coordinated approach to
prevent the spread of CRE?**

Patient sharing among Long Beach healthcare facilities is well documented



CDC recommends a “coordinated approach” to reduce antibiotic-resistant infections in healthcare facilities

- Common approach – individual healthcare facilities apply contact precautions only to CRE-colonized or infected patients identified through routine tests
- Independent augmented efforts – some facilities begin active detection (i.e., CRE surveillance cultures) and isolation of CRE-colonized patients
- **Coordinated augmented approach** – facilities share CRE data with public health, and notify receiving facilities of patients’ CRE status upon inter-facility transfer

Facilities work together to protect patients.

Common Approach *(Not enough)*

- Patients can be transferred back and forth from facilities for treatment without all the communication and necessary infection control actions in place.

Independent Efforts *(Still not enough)*

- Some facilities work independently to enhance infection control but are not often alerted to antibiotic-resistant or *C. difficile* germs coming from other facilities or outbreaks in the area.
- Lack of shared information from other facilities means that necessary infection control actions are not always taken and germs are spread to other patients.

Coordinated Approach *(Needed)*

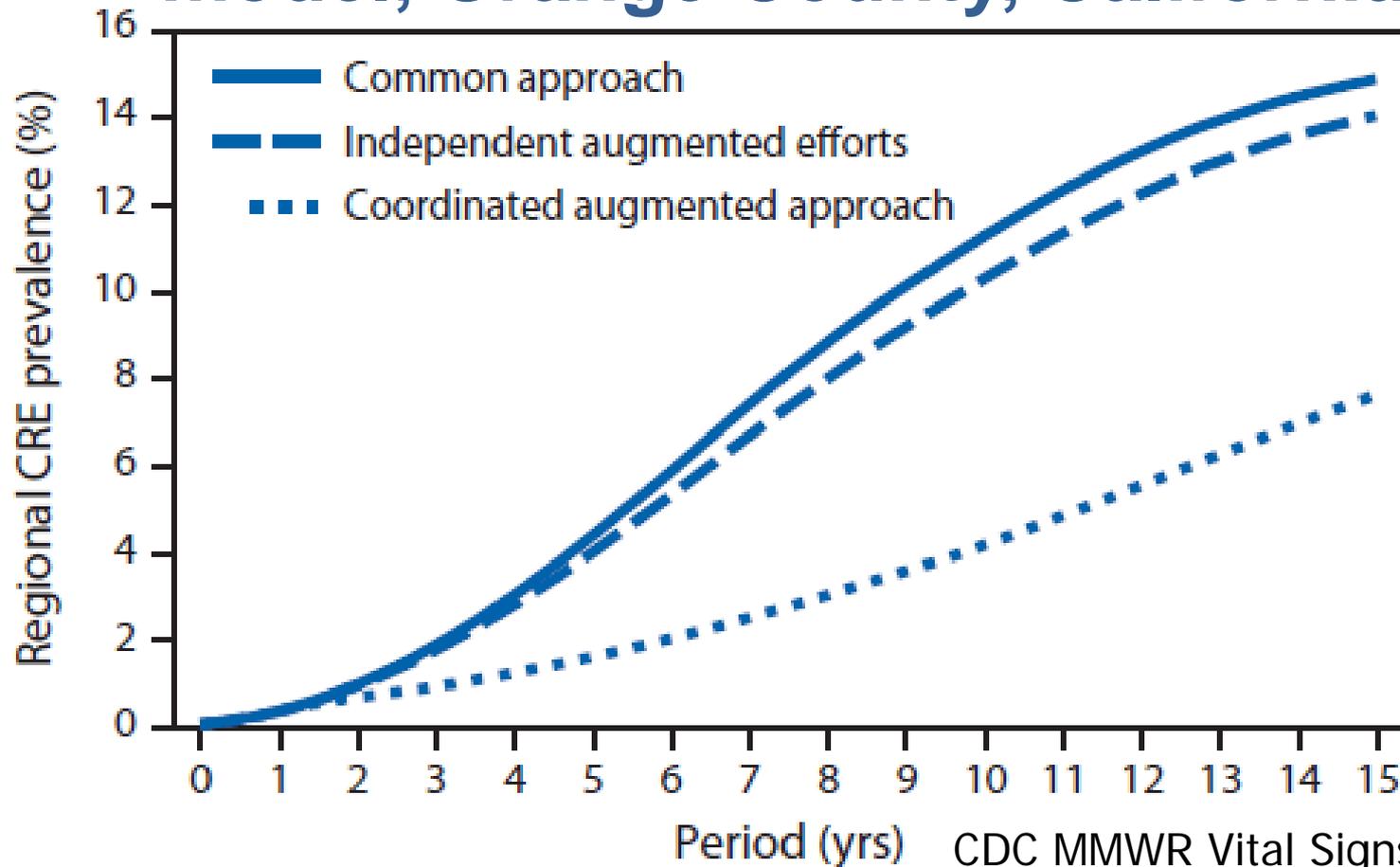
- Public health departments track and **alert** health care facilities to antibiotic-resistant or *C. difficile* germs coming from other facilities and outbreaks in the area.
- Facilities and public health authorities share information and implement shared infection control actions to stop spread of germs from facility to facility.



Figure from CDC Vital Signs: ent of ilth

<http://www.cdc.gov/vitalsigns/stop-spread/index.html>

Projected countywide prevalence of CRE over a 15-year period under three different intervention scenarios — 102-facility model, Orange County, California



Questions?

For more information, please contact
The HAI Program at
sam.horwich-scholefield@cdph.ca.gov

Thank you