

Regional MDRO Prevention Collaborative

Working to protect patients, visitors, and staff from harm

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Advancing Healthcare
Improving Health

What & Why

- A project to bring together partners in communities of care bridging the continuum of care levels
 - Core acute care hospital
 - Surrounding Skilled Nursing Facilities, Assisted Living Facilities, Rehabilitation Facilities
- MDRO is an increasing public health threat
 - Transfers of patients and residents spreads the concern
 - Differences in precautionary practices erodes confidence
 - Resistant bacteria spread between people; their mechanisms of resistance also can spread to other bacterial species

Josh Nahum

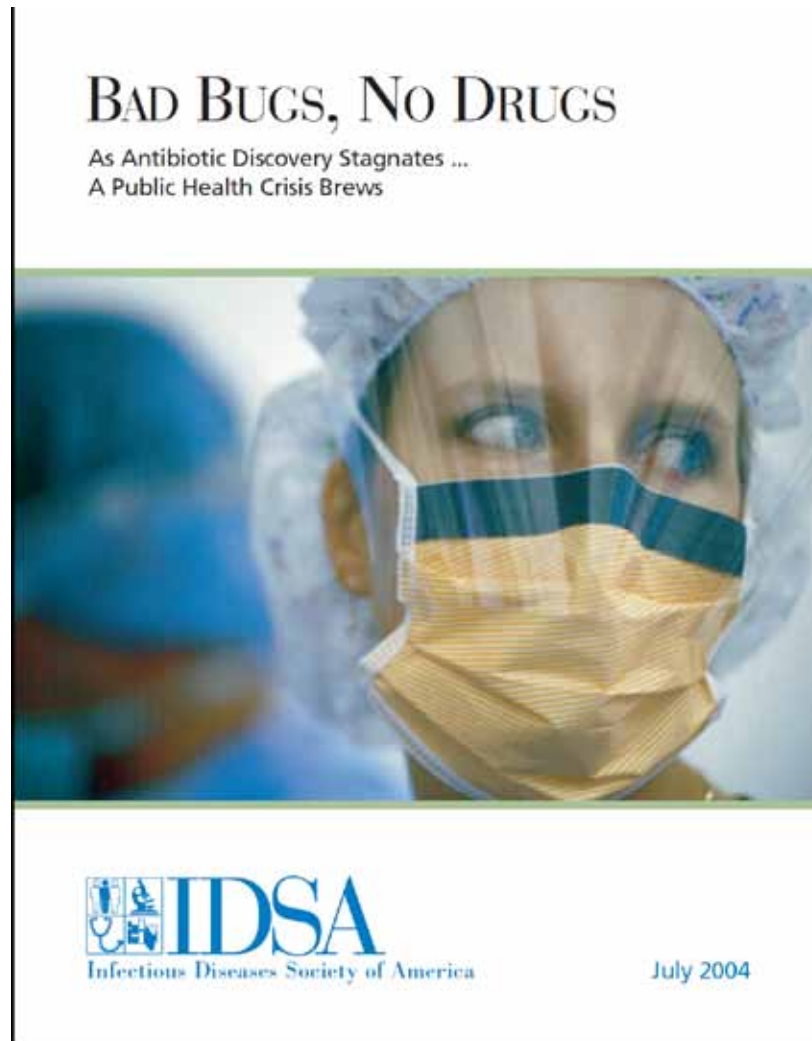


- Healthy college student
- Sky-diving accident – fractured femur and skull
- Developed MRSA during 6-week ICU stay
- Treated with antibiotics & transferred to rehab facility
- Developed *Enterobacter aerogenes* in cerebral spinal fluid
- Pressure around brain pushed it into spinal column
- Permanent quadriplegic, ventilator dependent
- Died 2 weeks later

“The tragic, unnecessary, and lasting impact of the loss of our son continues to this day. ...We look forward to a time when these infections no longer threaten to cut short the lives of the ones we love so much.”

Multidrug-Resistant Organisms (MDROs) - An Important Public Health Problem

- About 70% of bacterial infections in US resistant to at least one drug
- MDRO infections
 - Cause human pain and suffering
 - Lead to higher health care costs
 - Cost U.S. ~\$5 billion annually



MDROs are a Regional Issue

- Transmission between people happens
 - Within healthcare facilities
 - Between healthcare facilities that share patients
- Long term care (LTC) settings likely play important role
 - Transmission high within LTCs by some reports
 - LTC residence a major risk factor in MDRO carriage
 - LTC residents may serve as important reservoir for transmission when transferred to another setting

Acute Care Also Plays Key Role

Inter-facility transfers associated with VRE spread

- LTC residents with VRE were significantly more likely than those without VRE to have been inpatients at an acute care facility.
- Of 40 VRE isolates, 34 (85%) were a related strain.
- VRE isolates spread from acute care to LTC via patient transfers.

Regional Dissemination of Vancomycin-Resistant Enterococci Resulting from Interfacility Transfer of Colonized Patients

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During early 1997, the Southland District Health Department (SDHD; Sioux City, IA) reported an unusual incidence of vancomycin-resistant enterococci (VRE) isolates at area health care facilities. To determine the prevalence and risk factors for colonization with VRE strains at 12 health care facilities in the SDHD region, a prevalence survey and case-control study were performed. Of 2266 patients and residents, 1934 (85%) participated, and 40 (2.1%) were positive for (gastrointestinal) VRE colonization. The prevalence of VRE isolates was significantly higher in acute care facilities (ACFs) than in long-term care facilities (LTCFs) (100/112 [0.8%] vs. 100/192 [1.7%]; odds ratio [OR], 4.1; 95% confidence interval [CI], 1.8–9.0). LTCF case patients were significantly more likely than controls to have been inpatients at any ACF (19/50 vs. 1/296; OR, 8.6; 95% CI, 2.7–21.6). Of 40 VRE isolates, 34 (85%) were a related strain. The predominant strain was present in all 12 LTCFs that had at least 1 case patient in each facility. Soon after the introduction of VRE isolates into this region, dissemination to multiple LTCFs resulted from resident transfer from ACFs to LTCFs.

Enterococci are a common and increasing cause of nosocomial infections. During 1989–1996, the proportion of enterococci reported to be vancomycin resistant in the National Nosocomial Infection Surveillance system increased from 0.1% to 34.2%. Once patients become colonized with vancomycin-resistant enterococci (VRE), they may remain colonized for long periods of time, creating a reservoir of VRE and thereby increasing the likelihood of nosocomial VRE transmission and subsequent patient infection. Although risk factors for colonization of infections of patients with VRE in acute care facilities (ACFs) have been established [1–3], few studies describe the epidemiology of VRE transmission within long-term care facilities (LTCFs) and between health care facilities [4]. Implementation of Centers for Disease Control and Prevention (CDC) recommendations in some ACFs has helped to

control VRE transmission [5–7]. However, despite aggressive tertiary infection-control efforts, interregional transfer of VRE-colonized patients between facilities can occur [8]. The transfer of VRE-colonized patients may promote regional transmission of VRE. A complete regional health care facility VRE point prevalence survey previously had not been conducted in the United States, and the contribution of interfacility transfer of VRE-colonized patients in establishing VRE endemicity in a community of health care facilities had not been determined. To assess such transmission, we conducted a point prevalence survey of all health care facilities in the Southland District Health Department (SDHD; Sioux City, IA) region and evaluated the role of interfacility VRE transmission.

Before December 1996, the SDHD had received no reports of VRE isolates at area health care facilities. From December 1996 through April 1997, the SDHD received reports of 39 VRE isolates from area health care facilities. Two ACFs sent 80 isolates to a reference laboratory for DNA typing by pulsed-field gel electrophoresis (PFGE). All isolates had a related genetic pattern. The abrupt recent increase in the number of patients with VRE infection or colonization and the genetic similarity of the isolates suggested recent introduction of VRE to this region. A task force was created to address the increased number of VRE isolates. CDC was contacted to assist the task force in designing an infection-control strategy for the region, including Sioux City and 16 predominantly rural communities. Facilities in three states and two facilities under the jurisdiction of the Indian Health Service were included. A prevalence survey, in both ACFs and LTCFs, was designed to assess the

Received 21 December 1996; revised 20 March 1997; electronically published 9 July 1998.

Presented in part: International Conference on Emerging Infectious Diseases, Atlanta, March 1998 (abstract P-23.01). Eighth Annual Meeting of the Society for Healthcare Epidemiology of America, Orlando, FL, April 1998 (abstract 73).

The human experimentation guidelines for the US Department of Health and Human Services were followed.

Use of trade names and commercial sources is for identification only and does not imply endorsement of the Public Health Service or the US Department of Health and Human Services.

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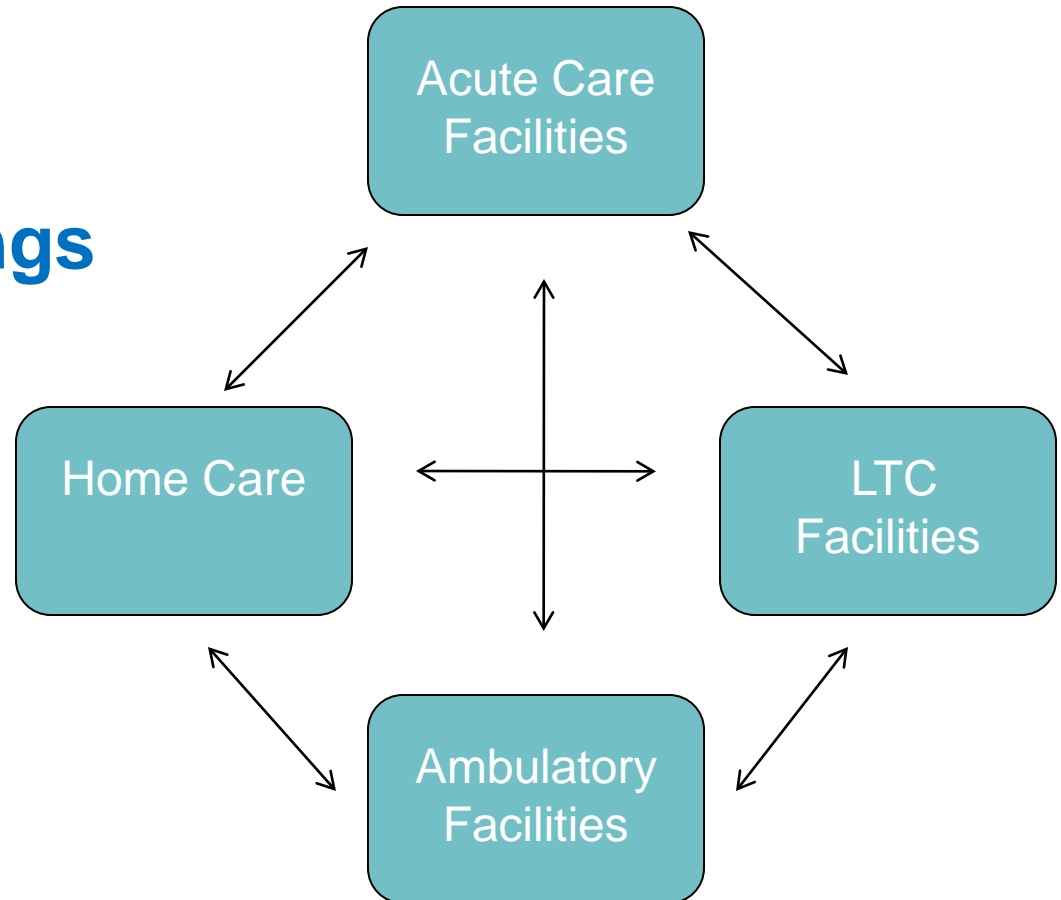
The Journal of Infectious Diseases, 1999, 180:391–6.
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0950-2688/99/080391-06

Source: Trick WE, et al. Regional dissemination of vancomycin-resistant enterococci resulting from inter-facility transfer of colonized patients. *J Infect Dis.* 1999 Aug;180(2):391-6.



Reality: Patients/Residents Move Across Settings

- MDRO infection outbreaks follow flow of colonized patients/residents



Example: MDR Salmonella enterica spread in Florida

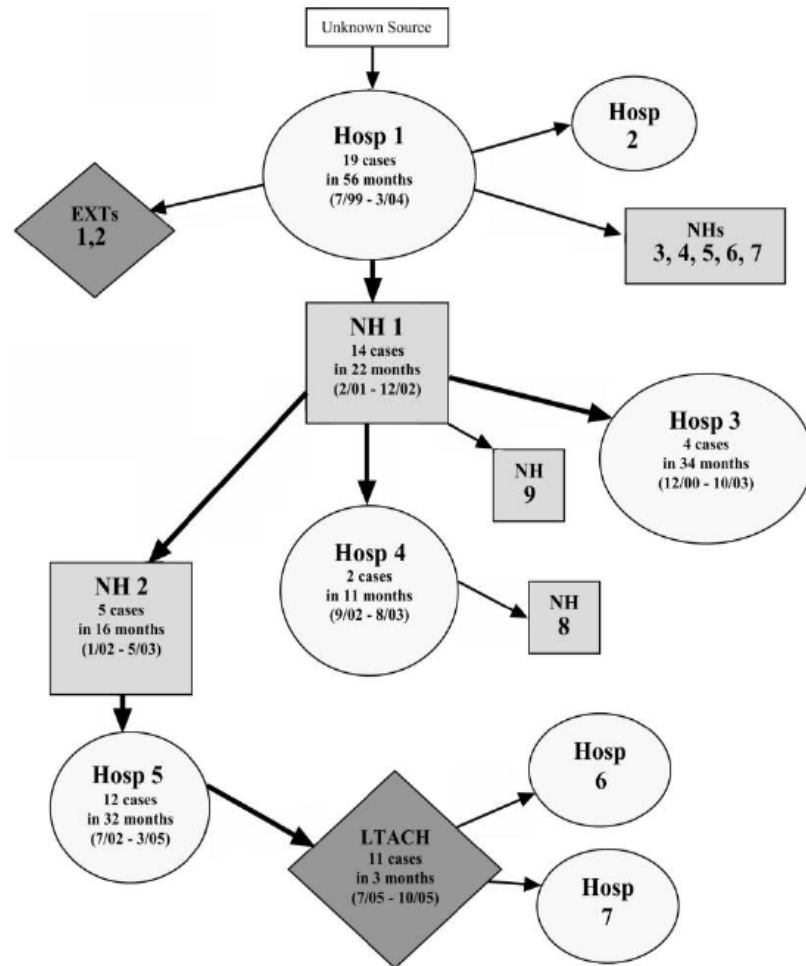
Hospital 1

Index patient a 47-year-old
2nd patient case 2 rooms away from ..
Eventually 19 cases at the hospital

Arrows represent transfer of case patients to other facilities – 19 in total:

- 7 hospitals
- 9 nursing homes
- 2 extended care facilities
- 1 long term care acute care hospital

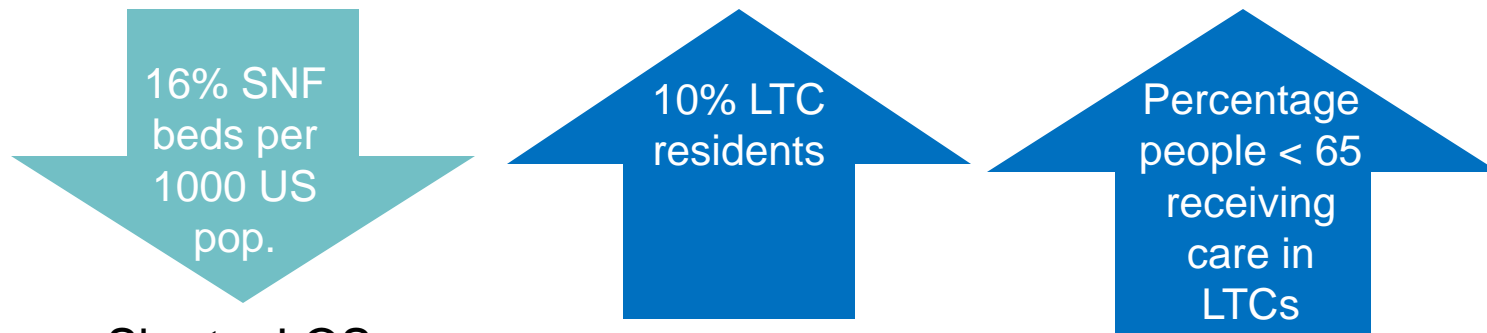
48 secondary cases occurred at 6 of these facilities



Kay RS, et al. Outbreak of healthcare-associated infection and colonization in multidrug-resistant Salmonella enterica serovar Senftenberg in Florida. Infect Control Hosp Epidemiol. 2007 Jul;28(7):805-11. Epub 2007 May 24.

Key Changes in LTCs

- From 1999 – 2008



- Shorter LOS
- Post-acute care population growing
- Custodial care shifting to ALFs or home-based options
- Increased device & antibiotic exposure in LTCs
- Increased risk of emergence & spread of MDROs

A Regional Approach to Control

- Establish communication between facilities sharing patient streams
 - Patient status/risk at transfer
- Create opportunities to share/learn
 - Best practices
 - Areas for improvement
- Facilitate shared resources/expertise
 - Government - Federal, State, County
 - Local Expertise: QIO, Infection Control Professionals & Regional Lab
- Put focus on patients/residents, not care silos

Promising Regional Efforts

Significant decrease in VRE prevalence achieved

- 32 facilities (4 acute care & 28 LTCs) participated in collaborative project
- Measurement
 - VRE prevalence
 - Infection control assessment survey
- Tailored Interventions
 - Based on survey
 - Patient risk
- Achieved reduced rates

Source: Ostrowsky BE, et al. Control of vancomycin-resistant enterococcus in health care facilities in a region. *Engl J Med*. 2001 May 10;344(19):1427-33.



The screenshot displays the journal's header with the logo and title 'The NEW ENGLAND JOURNAL of MEDICINE'. Below the header is a navigation bar with links for HOME, ARTICLES, ISSUES, SPECIALTIES & TOPICS, FOR AUTHORS, and Keyword. The main content area features the article title 'Control of Vancomycin-Resistant Enterococcus in Health Care Facilities in a Region' under the 'ORIGINAL ARTICLE' category. The authors listed are Beinda E. Ostrowsky, M.D., M.P.H., William E. Trick, M.D., Annette H. Sahn, M.D., Stephen B. Gurt, M.P.P., Stacey Hill, M.M.Sc., Loreta A. Carlson, M.S., Berna C. Hill, B.S., Matthew J. Antuna, Ph.D., Matthew J. Kuehnert, M.D., and William R. Jarvis, M.D. The publication information is 'N Engl J Med 2001; 344:1427-1433 | May 10, 2001'. Below the article title are tabs for Abstract, Article, References, and Citing Articles (72). The abstract text begins with 'During the past decade, vancomycin-resistant enterococci have emerged and become endemic at many health care facilities in the United States. 1-5 A major impediment to control is the large, unrecognized population of patients who are colonized with vancomycin-resistant enterococci and who thus can serve as a reservoir for transmission 7-9 Colonization with vancomycin-resistant enterococci has been associated with progression to infection 6 Studies suggest that once vancomycin-resistant enterococci are introduced in a facility, and particularly after they have spread to multiple patients or wards, control is very difficult 6-8' and continues with details of the study conducted in the Siouxdand region of Iowa, Nebraska, and South Dakota.

Consensus on Consistent Practice

- Rhode Island ICP task force developed statewide, consistent infection control practices to reduce MRSA

- Screening protocols
- Periodic prevalence studies
- Post-exposure follow-up
- Isolation precautions/practices
- Hand hygiene
- Environmental cleaning
- Antibiotic stewardship
- Communication

- Disseminated to all CEOs of RI hospitals

Source: Arnold MS, et al. The best hospital practices for controlling methicillin-resistant *Staphylococcus aureus*: on the cutting edge. *Infect Control Hosp Epidemiol*. 2002 Feb;23(2):69-76.



Vermont MDRO Prevention Collaborative

Goal: Acute care and LTC facilities work together to prevent MDRO infections

- 13 Cross-setting teams
- 1-year project (started 8/2010)
 - Share/Learn best practices
 - Implement process improvements
 - Network/Learn from participants
- 3 Learning Sessions/1 Outcomes Congress
- “What can we do by Tuesday” approach
- Prevention strategies
 - Hand hygiene
 - Contact precautions
 - Surveillance
 - Rapid reporting
 - Communication of MDRO/risk at time of transfer



Source: <http://vpqhc.org/interior.php/pid/13/sid/188>

Lower LTC MRSA Rates Possible

In study of 10 Orange Co. LTCs:



- 31% of residents carried MRSA
- Rates varied between facilities, 7% - 52%
- MRSA carriage was not dependent on intake rate
 - Two SNFs had identical intake rates (12%), but different overall MRSA carriage rates (22% and 42%)
 - Researchers to look at difference in practices between facilities

Source: Reynolds C, et al. Methicillin-Resistant Staphylococcus aureus (MRSA) Carriage in 10 Nursing Homes in Orange County, California. Infect Control Hosp Epidemiol. 2011 Jan;32(1):91-93. Epub 2010 Nov 18.

MRSA Carriage Rates Vary Widely in Nursing Homes, Study Finds

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A study published in the January 2011 issue of *Infection Control and Hospital Epidemiology* finds that a high percentage of nursing home residents carry methicillin-resistant *Staphylococcus aureus* (MRSA), and suggests that some nursing homes could be doing more to prevent the spread of the bacteria, which can lead to hard-to-treat infections.

The study, which looked at 10 nursing homes in Orange County, Calif., found that 31 percent of the residents who were tested were carrying MRSA (meaning they could pass the bacteria along to others, but were not necessarily sick with infection). That rate is substantially higher than rates found in hospitals and even intensive care units, according to Susan Huang, medical director of epidemiology and infection prevention at the University of California Irvine Medical Center and one of the study's authors.

The study also found, however, that carriage rates in each of the individual facilities in the study varied widely, from a high of 52 percent in one facility to a low of 7 percent in another.

"The high overall levels of MRSA are reason for concern," Huang says. "But the variation in rates between facilities may be good news because it suggests some facilities are finding effective ways to contain the bacteria."

Nursing homes have long been considered high risk facilities for MRSA infections. However, few studies have compared multiple facilities in one area to look for variation in MRSA carriage.

The researchers took nasal swabs from a sample of 100 residents in each of the 10 homes. They also took samples from 50 people at each home at the time they were admitted to get an idea of how much MRSA was coming into each facility.

The study found that a nursing home's rate of MRSA carriage was not simply a result of how much MRSA came in with new residents, and suggests that some homes do a better job than others of containing the bacteria once it arrives. For example, two nursing homes in the study had identical MRSA intake rates of 12 percent, but one of those homes had an overall MRSA carriage among its established residents of 22 percent, while the other had a rate of 42 percent.

The next step, Huang says, is to find out exactly what these facilities are doing to better contain MRSA.

Mechanisms of resistant not previously seen in the USA are arriving in our own Washington communities

www.cdc.gov/mmwr

Update: Detection of a Verona Integron-Encoded Metallo-Beta-Lactamase in *Klebsiella pneumoniae* — United States, 2010

On September 21, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).

In July 2010, CDC was notified of a patient with a carbapenem-resistant *Klebsiella pneumoniae* strain that produced a Verona integron-encoded metallo-beta-lactamase (VIM) carbapenemase (*β*) not reported previously among *Enterobacteriaceae* in the United States. The patient was a woman from the United States who became ill with diarrhea during a Mediterranean cruise and was hospitalized in Greece, where she received a diagnosis of sepsis and *Clostridium difficile* infection. After 12 days in two hospitals in Greece, she was transferred to a hospital in the United States for continued management of sepsis and acute renal failure. On admission, blood was drawn for culture through a central venous catheter that had been placed while the patient was hospitalized in Greece. The blood subsequently grew carbapenemase-producing *Klebsiella pneumoniae* exhibiting the VIM resistance mechanism, which has been described previously in Greece but not in the United States. Further testing showed the isolate to be nonsusceptible to all antimicrobials usually used to treat *Klebsiella*. Despite the resistance of the *Klebsiella* strain, the patient recovered sufficiently to be discharged after 26 days in the U.S. hospital. A search for other patients colonized with the same isolate was conducted by screening 22 patients whose U.S. hospital stays overlapped with this patient; no carbapenem-resistant *Enterobacteriaceae* (CRE) were detected.

This report of a VIM-producing CRE follows a June 2010 report of three cases of New Delhi metallo-beta-lactamase (NDM-1)-producing *Enterobacteriaceae*

(2). However, the most common mechanism of carbapenem resistance among *Enterobacteriaceae* in the United States remains the production of the *Klebsiella pneumoniae* carbapenemase (KPC). KPC-producing *Enterobacteriaceae* are widespread in the United States and other countries (3). Cases of CRE are a significant, emerging public health problem regardless of the mechanism of carbapenem resistance, and procedures to rapidly recognize and report CRE cases to infection prevention personnel should be in place in all acute and long-term-care facilities. Facilities that have not identified cases of CRE should undertake periodic laboratory reviews to identify cases. Patients with CRE should be managed using contact precautions, and patients exposed to CRE patients (e.g., roommates) should be screened with surveillance cultures (3). State and local health departments should promote adoption of current prevention guidance and monitoring of the prevalence of these organisms in their jurisdictions (3). Public health officials and health-care facility staff can consult with the Division of Healthcare Quality Promotion at CDC on the best practices for identifying and preventing transmission of these organisms (e-mail: hhq@cdc.gov).

References

1. Vaziripour A. High rates of metallo-beta lactamase producing *Klebsiella pneumoniae* in Greece—a review of the current evidence. *Ann Intern Med* 2008;133:1–6.
2. CDC. Detection of *Enterobacteriaceae* isolates carrying metallo-beta-lactamase—United States, 2010. *MMWR* 2010;59:750.
3. CDC. Guidance for control of infections with carbapenem-resistant or carbapenemase-producing *Enterobacteriaceae* in acute care facilities. *MMWR* 2009;58:256–60.

Opportunity

We invited facilities to join in a Regional MDRO Prevention Collaborative

Goal of the Collaborative

Establish a regional, cross-setting team comprised of acute and long-term care facilities that works together to foster best practices and effective communications, resulting in better control of MDROs

Objectives

- Protect patients, staff, and visitors from harm
- Build infection control knowledge and skills within participating facilities
- Identify common infection control challenges faced by participating facilities
- Address common challenges with small tests of change
- Improve communication between participating facilities regarding MDROs

Receive

- Infection control best practice education and guidance
- Assistance with
 - infection control needs assessment, gap analysis, goal-setting, and process improvement strategies
- Facilitated sharing/learning during Collaborative meetings
- Resources, training, and technical assistance matched to your improvement goals

Potential Impact

- Reduce pain and suffering caused by MDRO infections
- Improve resident satisfaction by reducing spread of infections while maintaining quality of life
- Ensure effective communication between acute and LTC facilities
- Improve their ability to safely and quickly place patients/residents in the region

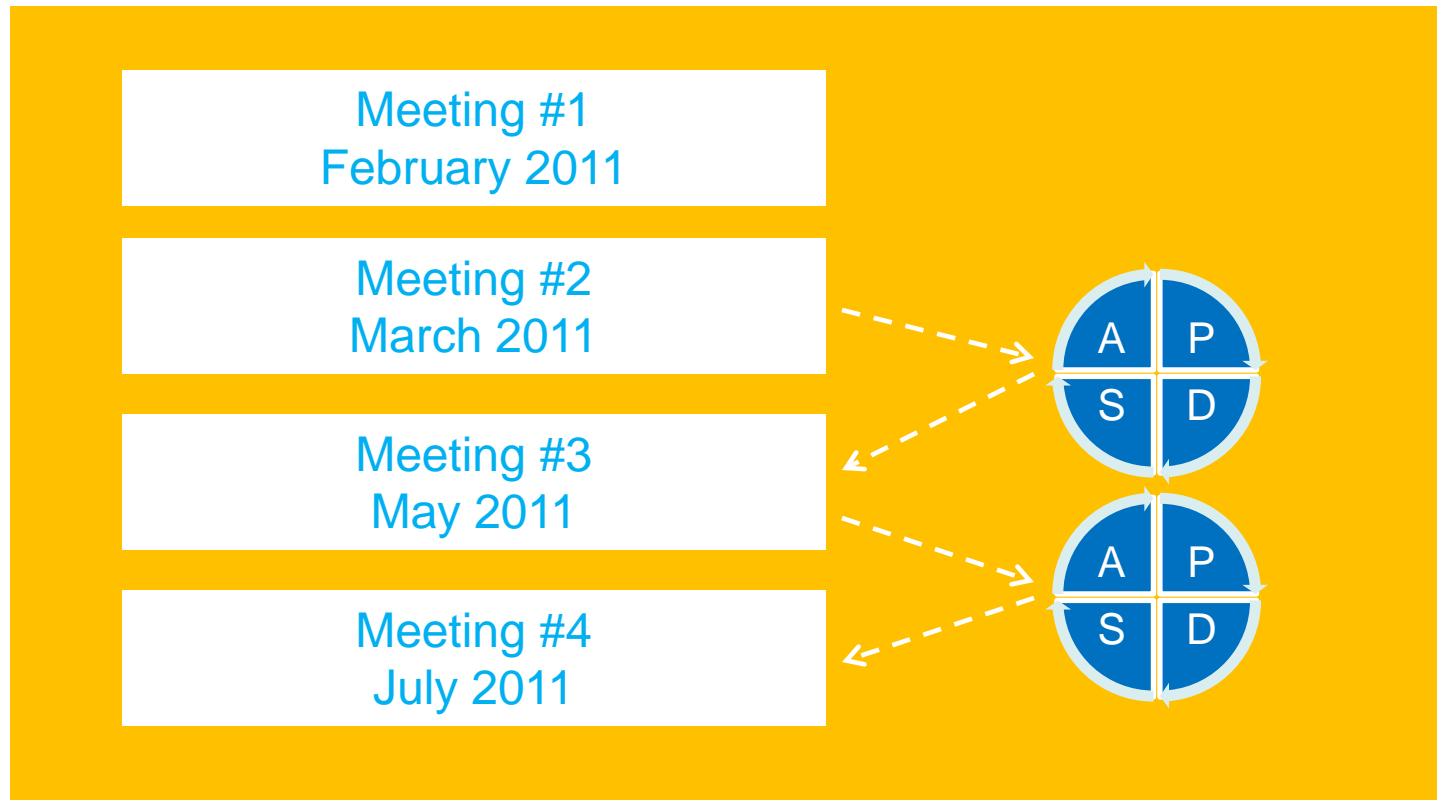
Their Commitment

- Identify a team of individuals from each of their facilities to attend Collaborative meetings in your community
- Complete a quick infection control assessment survey
- Attend and participate in the all meetings
- Pursue small tests of change to address improvement goals in between meetings
- Report out during meetings on progress made or barriers encountered

Our Commitment

- Organize and facilitate Collaborative meetings to take place in their community
- Match resources, technical assistance, and training to group's improvement goals
- Provide support and assistance throughout the Collaborative

Pilot Project Schedule



PDSA

- Decide what should happen in next cycle
 - Modify test(s)
 - Expand pilot
 - Share findings
 - How to sustain any gain made

- Learn about current situation
- Research best practices
- Prioritize/select improvements to test
- Plan how to test
- Collect baseline data



- Analyze data
- Discuss what was learned
- Summarize findings

- Try the improvements
- Document problems, observations
- Collect data as planned

More Detail

When	What	Detail
February	Meeting #1	<ul style="list-style-type: none"> •Overview of Collaborative and PDSA mini-training •Sign MOU and submit to QH •Complete Team Roster Form and submit to QH •Complete assessment survey and submit to QH
March	Meeting #2	<ul style="list-style-type: none"> •Review assessment & facilitate gap analysis •Reach agreement on goals most valuable to team •Identify tools/resources needed based on goals
April	Support & PDSA	<ul style="list-style-type: none"> •QH/DOH coach & provide tools/resources •Team uses PDSA to work on goals •Team members submit “report out” worksheets
May	Meeting #3	<ul style="list-style-type: none"> •Report out on efforts since Meeting #1 •Expert speaker/content to match team needs •Prioritize next steps (PDSA, resources, etc.)
June	Support & PDSA	<ul style="list-style-type: none"> •QH/DOH coach & provide tools/resources •Team uses PDSA to work on goals •Team members submit “report out” worksheets
July	Meeting #4	<ul style="list-style-type: none"> •Report out & summarize successes •Expert speaker/content to match team needs •Discuss next steps (Continue? Share ? etc.) •LTC quick re-measurement survey

Core Team

State Department of Health

- David Birnbaum, PhD, MPH*
- Dr. Anthony Marfin, MD, MPH, MA
- M. Jeanne Cummings, RN, CIC

Qualis Health

- Tina Schwien, MN, MPH*
- Jennifer Palagi, MPH, BSN, CIC
- Sharon Eloranta, MD, George W. Merck/IHI Fellow

*Denotes key contacts

Progress to date

- Both communities were immediately receptive.
- The CDC self-assessment survey form proved useful in profiling similarities & differences between facilities
 - Infection control resources
 - Policies & practices
 - Perceived greatest challenges
- Both quickly generated over a dozen ideas for potential projects
- Each community chose two projects (which differed from each other) that best fit their own sense of needs and priorities
 - Education & Communication (for staff; for residents & families)
 - Policy development and compliance assessment
 - Hand hygiene (for staff; for residents & families)
 - Antimicrobial stewardship
 - Environmental cleaning & disinfection

Progress to date (cont.) – Typical comments from participants – They liked:

- ü “Seeing everybody from different healthcare facilities communicating and working together”
- ü “It ran pretty fluidly. I was concerned it would be dry and drag out”
- ü “Hearing from other facilities. Interaction and open format”
- ü “The openness and informality and, of course, the exchange of ideas”
- ü “The discussions that can benefit my facility”
- ü “The reminder of why we do what we do. We tend to get caught up in the day to day and we need to look at the big picture”

Questions



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