

***This presentation is brought to you by the South Dakota Department of Health Healthcare-associated Infections Program. Used with permission from The Association of Professionals in Infection Control (APIC).***

Funded through a grant from the Centers for Disease Control and Prevention.



# **Infection Prevention Program Basics: Part II**

**Emerging Infectious Disease/MDROs/HAIs**

**Isolation Precautions**

**Seasonal Influenza**

**Occupational Health**

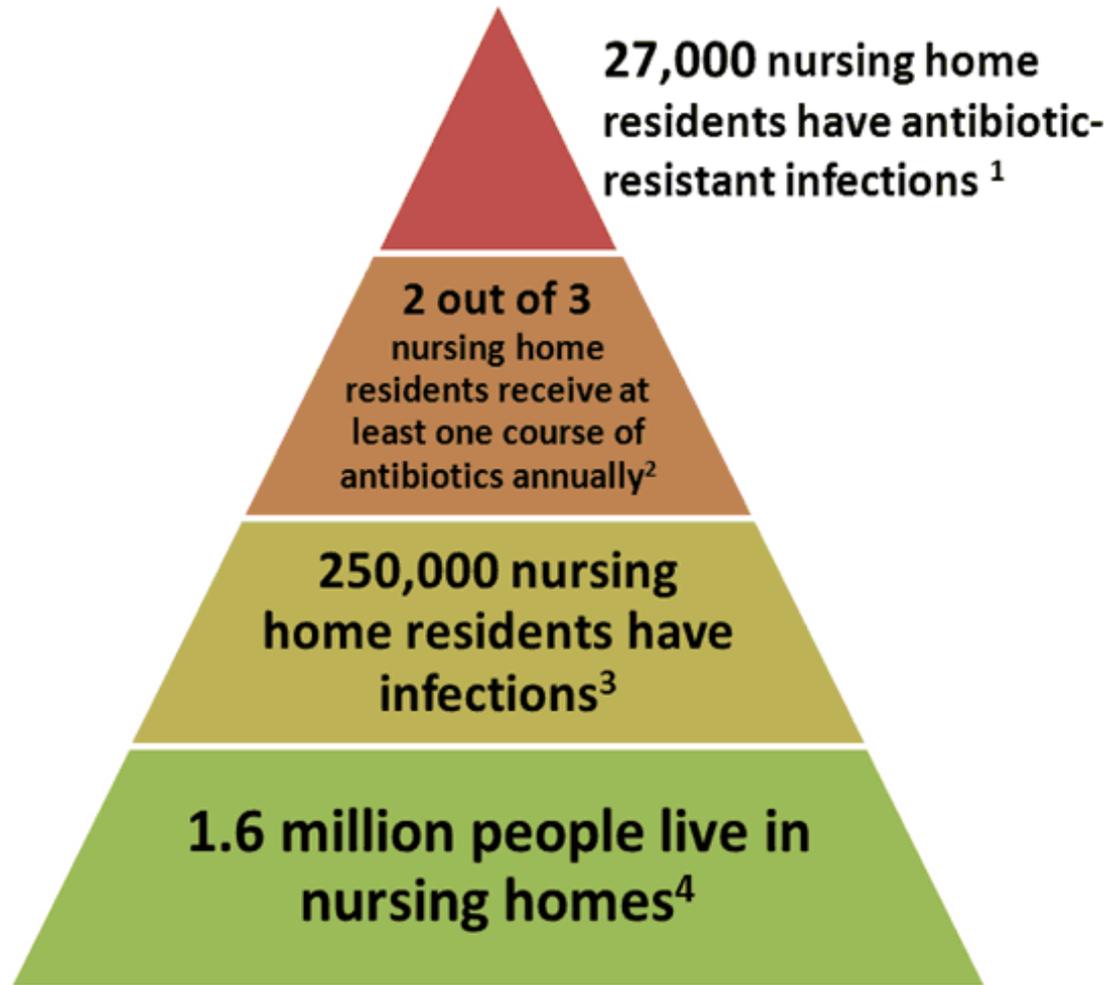
**Environment and Equipment**

# Infection Prevention Program: Part II

- Environmental cleaning and disinfection
- Multi-drug Resistant Organisms
- Antimicrobial Stewardship Programs
- Unique long-term care issues such as care transitions and life enrichment activities
- Occupational health, immunization programs, and staff education

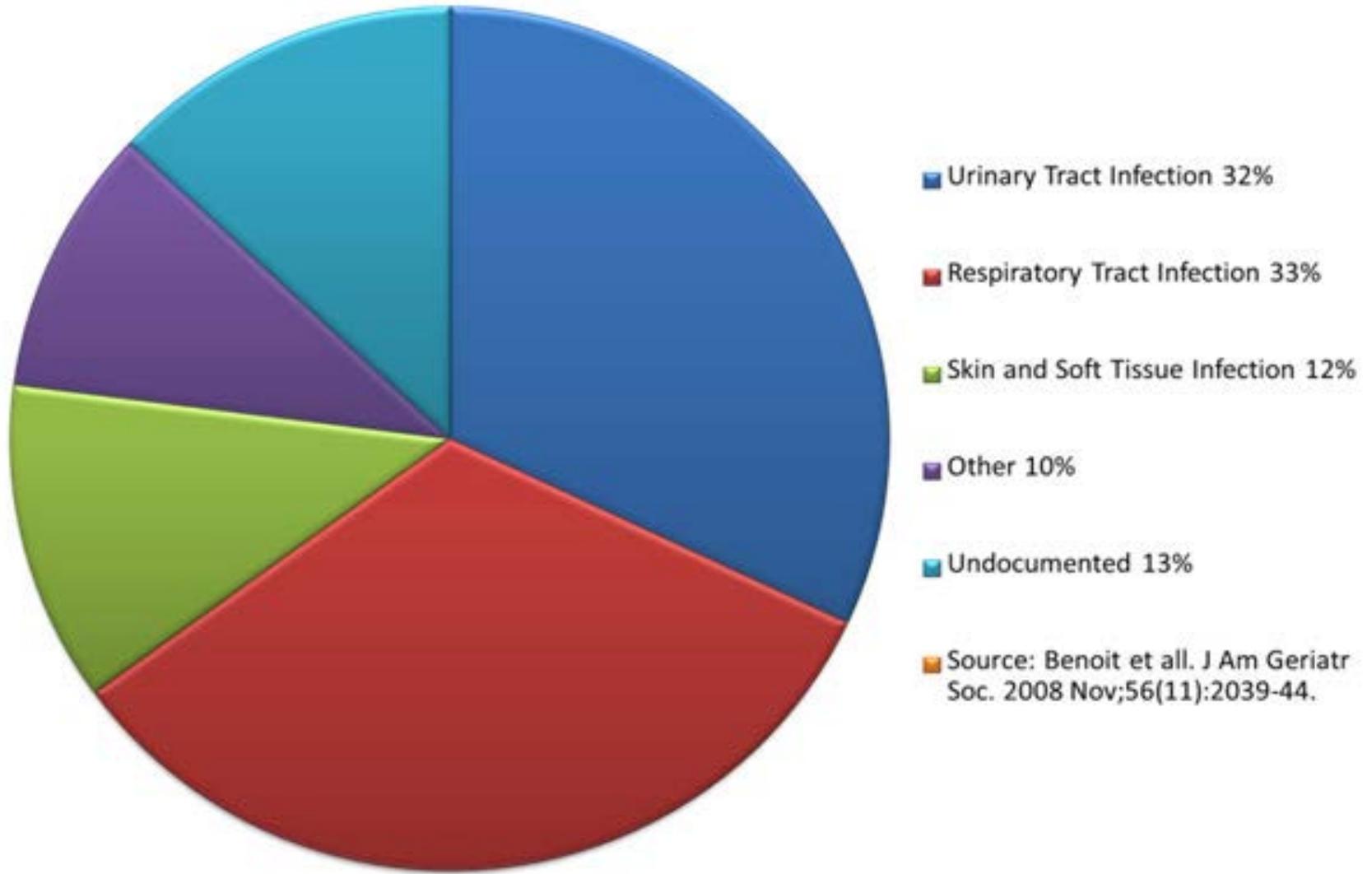
# Emerging Infectious Disease

- Emerging pathogens will certainly keep IPs busy!!
- Recent examples include CRE, KPC, MRSA, C diff, prion-associated conditions, the SARS epidemic in 2003, and concerns about avian flu and possible acquisition and transmission of H5N1 or H7N7
- SARS outbreaks and acquisition by health care personnel might have helped hospital staff and policy makers to recognize that failure to comply with infection control practices might be at the cost of health care workers' lives



1. Centers for Medicare and Medicaid Services, Long Term Care Minimum Data Set, Resident profile table as of 05/02/2005. Baltimore. MD.
2. Loeb, M et.al. Antibiotic use in Ontario facilities that provide chronic care. J Gen Intern Med 2001; 16: 376-383.
3. Centers for Medicare and Medicaid Services, Long Term Care Minimum Data Set, Resident Profile Table as of 05/02/2005. Baltimore, MD.
4. Centers for Disease Control and Prevention, National Center for Health statistics, 1999 National Nursing Home Survey. Nursing Home Residents, number, percent distribution, and rate per 10,000, by age at interview, according to sex, race, and region: United States, 1999.

## Most common infections treated with antibiotics in nursing homes





# Scope of the problem in Long Term Care Facilities

- Antibiotics among most commonly prescribed medications
- Up to 70% of LTCFs residents receive an antibiotic per year
- Cost of antibiotics in LTC setting range from \$38 to \$137 million per year
- Antibiotic-resistant organisms most common in LTCF are:
  - multidrug-resistant **Gram-negative bacteria**,
  - methicillin-resistant **Staphylococcus aureus (MRSA)**
  - **Vancomycin-resistant enterococci (VRE)**

# Contributing Factors

- Many LTC residents can be "colonized" with MDRO bacteria
- Challenges with separating colonization from true infection can contribute to antibiotic overuse in this setting
- Studies have consistently shown that about 30%-50% of frail, elderly LTC residents can have a positive urine culture but asymptomatic of a urinary tract infection and many are (still) placed inappropriately on antibiotic therapy

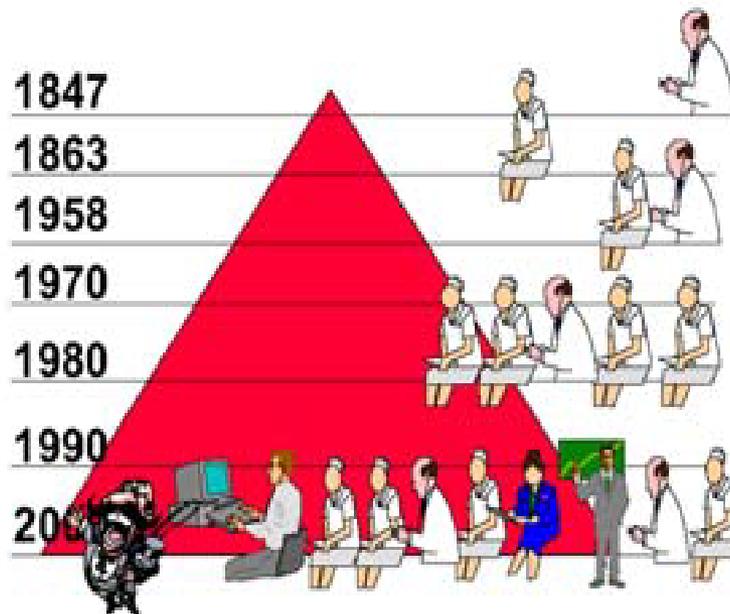
# Resident Safety at Risk

- Poor communication about antibiotic treatment of a patient, who is transferred from a hospital to a LTCF may result in prolonged or inappropriate antibiotic therapy
- Antibiotic-related complications from *C. difficile* can be more severe, difficult to treat, and lead to more hospitalizations and deaths among people over 65 years
- LTCF residents are particularly at risk for these complications

# Current trends in health care

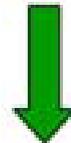
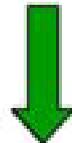
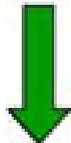
- Technical and scientific advances
- Benchmarking
- Increasingly complex care delivery
- Shortening of hospital stay
- Early discharge to poorly prepared structures
- Quality health care at lower cost
- Lack of comprehensive data on home, ambulatory, and LTCFs health care-associated infectious complications
- Shortage of nursing workforce

# Infection Control and Quality Healthcare in the New Millenium



Healthcare system:

- Hospitals
- Ambulatory services
- Nursing homes
- Long-term care facilities
- Home care delivery systems



State/country  
epidemiology  
program

International  
surveillance  
systems

Financing  
bodies

Patient safety  
promotion

# Multiple Drug Resistant Gram-Negative Infections

<http://www.pbs.org/wgbh/nova/body/killer-microbe.html>



# Enterobacteriaceae

- Citrobacter
- Enterobacter
- *Escherichia coli*
- Klebsiella
- *Morganella morganii*
- Proteus
- Providencia
- Salmonella
- Serratia
- Shigella
- Yersenia

# Gram Negative MDROs

- Resistance to antimicrobial agents is increasing among many gram-negative pathogens
- Infection with resistant pathogens is associated with negative health outcomes
  - Mortality/morbidity
  - Length of ICU and hospital stay
  - Healthcare costs
- Few antibiotic choices remain
  - Highlights the need to optimize existing classes of antimicrobials through stewardship and infection prevention

# Multi-Drug Resistant Gram Negative Rods (GNR): CDC Definition

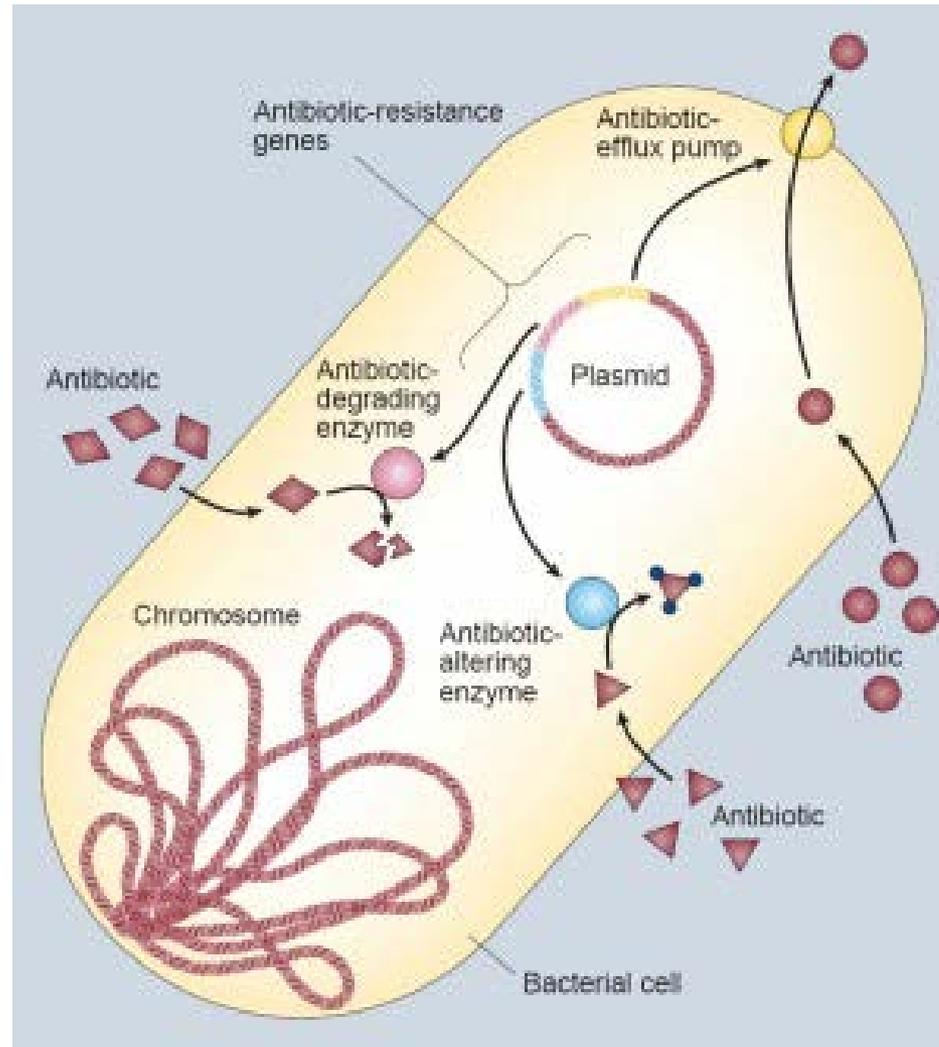
- MDR: Resistant to  $\geq 3$  classes\*
- XDR: Susceptible to  $\leq 2$  agents
- Pan resistance: Resistant to all available antimicrobials
- Current MDRO gram negatives include *E. coli*, *P. aeruginosa*, *K. pneumoniae*, *K. oxytoca*, *A. baumannii*

\*Classes: Beta-lactams, fluoroquinolones, aminoglycosides, carbapenems

# Review of Selected Antimicrobial Classes

- Beta-lactams
  - Penicillins and cephalosporins
- Fluoroquinolones
  - Ciprofloxacin, Gemifloxacin, Levofloxacin, Moxifloxacin
- Aminoglycosides
  - Amikacin, Gentamicin, Streptomycin, Tobramycin, Kanamycin, Neomycin
- Carbapenems
  - Doripenem, Meropenem, Ertapenem, Imipenem

# Emergence of MDROs



# **Extended Spectrum $\beta$ -lactamases (ESBLs) Risk Factors for Colonization/Infection\***

- Hospitalization
- Nursing home residency
- Length of hospital/ICU stay
- Severity of illness
- Antibiotic exposure (esp. ceftazidime, aztreonam)
- Invasive devices/instrumentation

# Carbapenem Resistance

- Widespread use of carbapenems for suspected ESBL infection has contributed to resistance due to selection
- Emergence of carbapenemase (a group of beta-lactamases) in enterobacteriaceae
- *Klebsiella pneumoniae* carbapenemase (KPC)-producing organisms
  - *Klebsiella* spp.
  - *Enterobacter* spp.
  - *E. coli*
  - *Serratia* spp.

# ***Klebsiella pneumoniae* carbapenemase (KPC)-producing organisms**

- *Resistant to carbapenems: MICs >32 mg/L*
- Generally susceptible to tigecycline
- Further studies are needed to ascertain risk factors (East coast)
- Available data describe patients with infections caused by KPC-producing organisms as:
  - Receiving long courses of broad spectrum antibiotics
  - Prolonged ICU stays

# Current Status of Antimicrobials

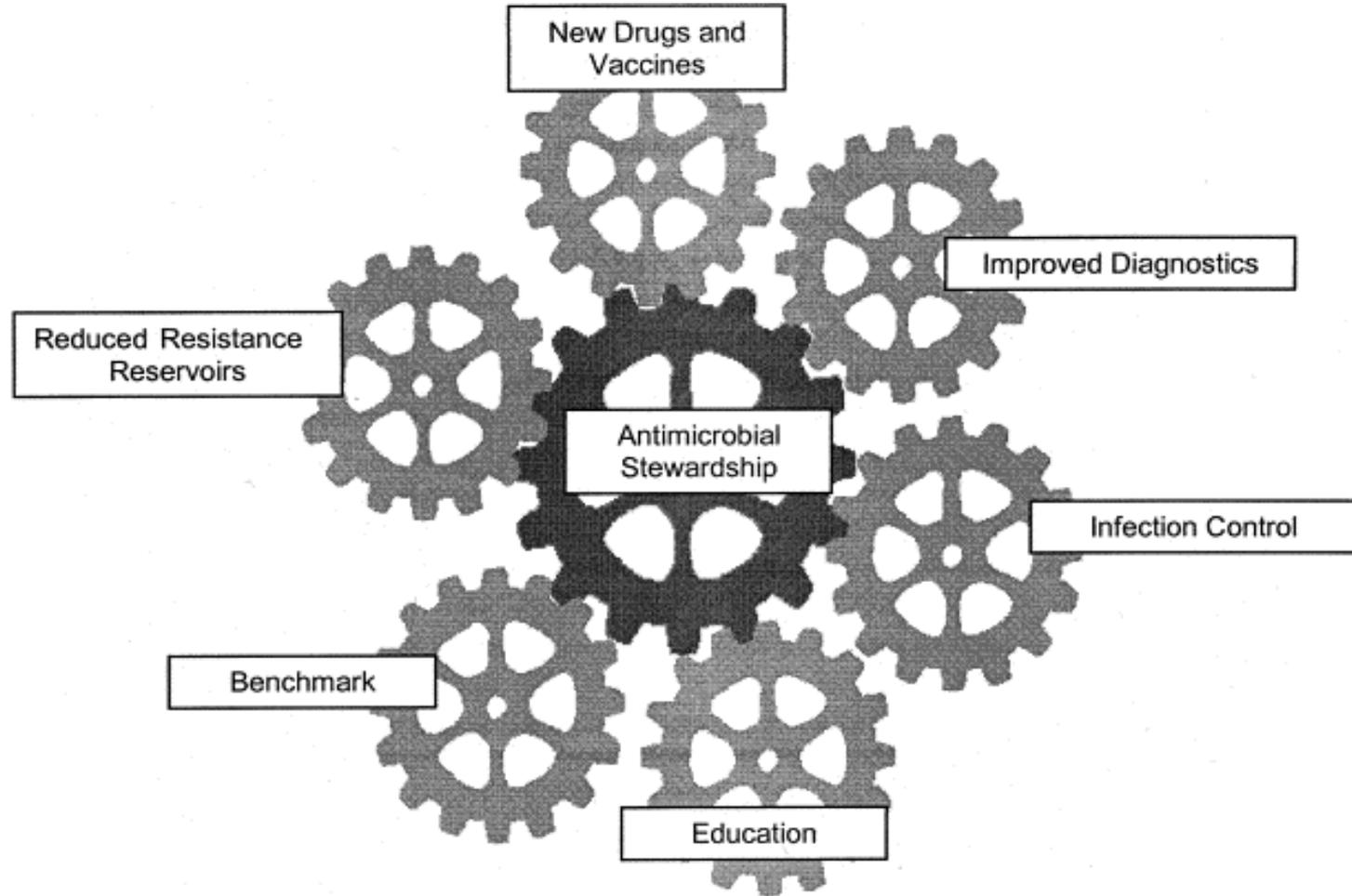
- No new classes 1968-2000
- Since 2000, only 4 new classes approved by FDA
  - Linezolid
  - Streptogramins
  - Daptomycin
  - Tigecycline
- Apart from Tigecycline, no new class of agents against Gram-negative organisms

**Effective largely  
against MRSA &  
VRE**

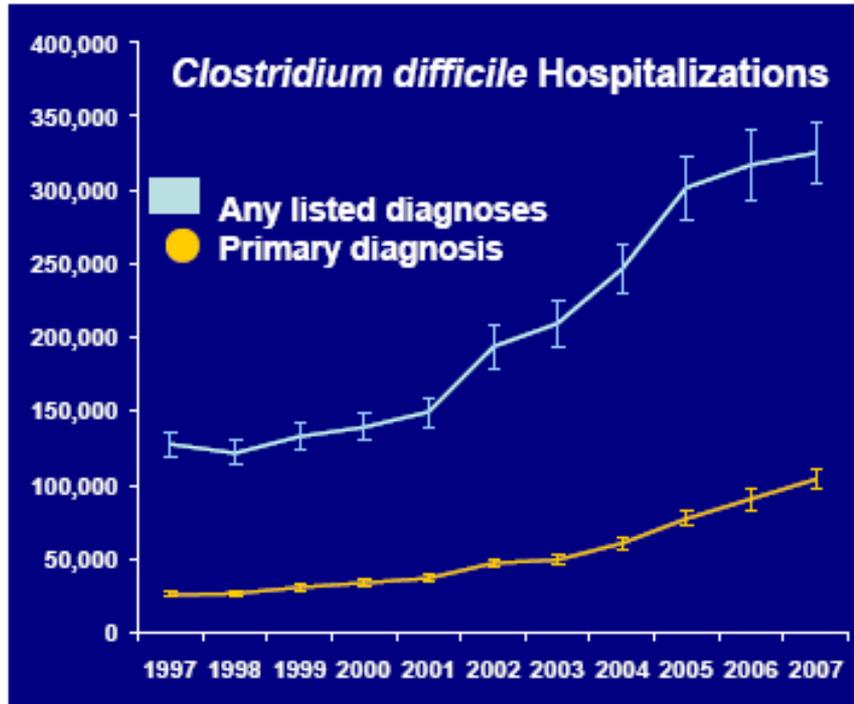
# Transmission of Resistant Organisms

- Contact with healthcare worker
  - Lack of hand hygiene, inadequate patient care techniques, contaminated supplies/equipment
- Failure to implement contact precautions (at all or early enough)
- Inadequate environmental attention
- Promoting of resistance through inappropriate antimicrobial therapy
- Failure to identify prevention breaches and intervene

# Antimicrobial Stewardship: A Call to Action!!



# Background: Impact



- Hospital-acquired, hospital-onset: 165,000 cases, \$1.3 billion in excess costs, and 9,000 deaths annually
- Hospital-acquired, post-discharge (up to 4 weeks): 50,000 cases, \$0.3 billion in excess costs, and 3,000 deaths annually
- Nursing home-onset: 263,000 cases, \$2.2 billion in excess costs, and 16,500 deaths annually

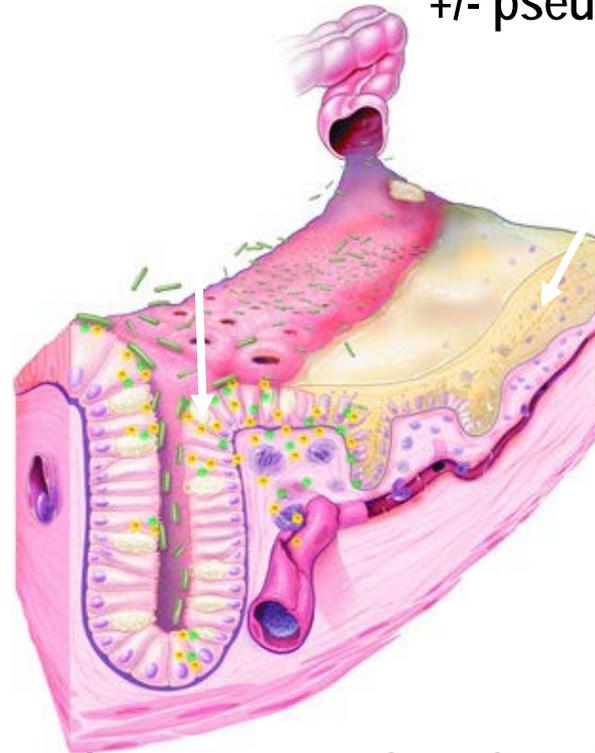
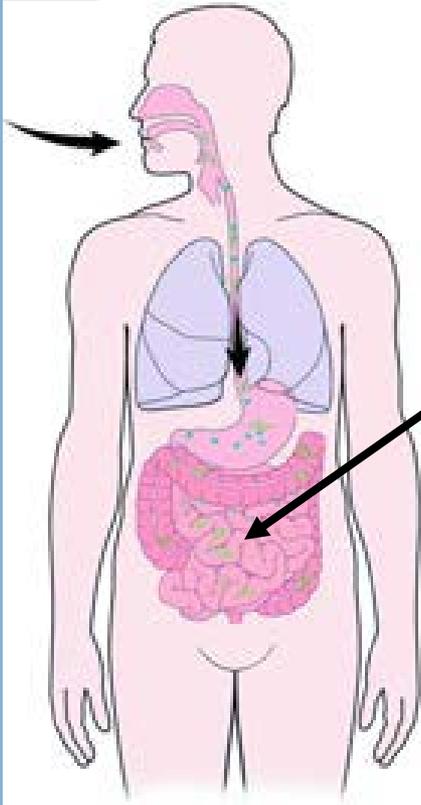
# Background: Pathogenesis of CDI

1. Ingestion of spores transmitted from other patients via the hands of healthcare personnel and environment

3. Altered lower intestine flora (due to antimicrobial use) allows proliferation of *C. difficile* in colon

4. Toxin A & B Production leads to colon damage +/- pseudomembrane

2. Germination into growing (vegetative) form



Sunenshine et al. Cleve Clin J Med. 2006;73:187-97

## Background: Epidemiology

# Current epidemic strain of *C. difficile*

- BI/NAP1/027, toxinotype III
- **Historically uncommon – epidemic since 2000**
- More resistant to fluoroquinolones
  - Higher MICs compared to historic strains and current non-BI/NAP1 strains
- **More virulent**
  - Increased toxin A and B production
  - Polymorphisms in binding domain of toxin B
  - Increased sporulation

McDonald et al. N Engl J Med. 2005;353:2433-41.  
Warny et al. Lancet. 2005;366:1079-84.  
Stabler et al. J Med Micro. 2008;57:771-5.  
Akerlund et al. J Clin Microbiol. 2008;46:1530-3.

## Background: Epidemiology

# Risk Factors

- Antimicrobial exposure
- Acquisition of *C. difficile*
- Advanced age
- Underlying illness
- Immunosuppression
- Tube feeds
- ? Gastric acid suppression

# Supplemental Prevention Strategies: Environmental Cleaning

- Bleach can kill spores, whereas other standard disinfectants cannot
- Limited data suggest cleaning with bleach (1:10 dilution prepared fresh daily) reduces *C. difficile* transmission
- Two before-after intervention studies demonstrated benefit of bleach cleaning in units with high endemic CDI rates
- Therefore, bleach may be most effective in reducing burden where CDI is highly endemic

# Summary of Prevention Measures

## Core Measures

- Contact Precautions for duration of illness
- Hand hygiene in compliance with CDC/WHO
- Cleaning and disinfection of equipment and environment
- Laboratory-based alert system
- CDI surveillance
- Education

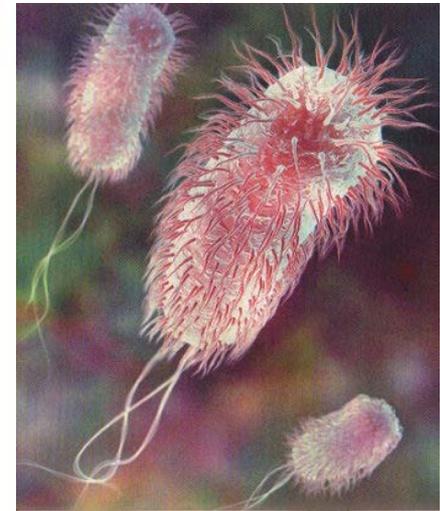
## Supplemental Measures

- Prolonged duration of Contact Precautions\*
- Presumptive isolation
- Evaluate and optimize testing
- Soap and water for HH upon exiting CDI room
- Universal glove use on units with high CDI rates\*
- Bleach for environmental disinfection
- Antimicrobial stewardship program

\* Not included in CDC/HICPAC 2007 Guideline for Isolation Precautions



**What is  
ST 131??**



# ST131 infection is more prevalent in LTCF residents and elderly population

- Antibiotic-resistant *Escherichia coli* (*E. coli*) continues to proliferate due to expansion of a strain of *E. coli* known as sequence type ST131
- A new study points to hospitals and long-term care facilities (LTCF) as settings in which this antibiotic-resistant strain is increasingly found
- The expansion of *E. coli* strain ST131 is recognized as a pandemic, but has received comparatively little attention in the United States

# *E. coli* ST131

- ***E. coli* is the most common gram-negative pathogen, causing both gastrointestinal disease and extra-intestinal infections; other infections include:**
  - pneumonia
  - meningitis
  - bloodstream
  - urinary tract
  - abdominal
  - wound infections
- **Strains of *E. coli* that are resistant to single or multiple classes of antibiotics are becoming more prevalent.**
- ***E. coli* ST131 is commonly associated with fluoroquinolone resistance.**



# Minnesota (March 12, 2013)

- **In this retrospective study, investigators evaluated nearly 300 consecutive patients in Olmsted County, Minnesota**
- **Extra-intestinal *E. coli* infections**
- **Found ST131 to be a dominant, antimicrobial-resistant clonal group**

Ritu Banerjee, Brian Johnston, Christine Lohse, Stephen B. Porter, Connie Clabots and James R. Johnson. "Escherichia coli Sequence Type 131 Is a Dominant, Antimicrobial-Resistant Clonal Group Associated with Healthcare and Elderly Hosts." *Infection Control and Hospital Epidemiology* 34:4 (April 2013).

# ST131 in LTCFs

- **LTCF residence was the strongest predictor of ST131 infection**
- **LTCF residents having 8 times the risk of contracting *E. coli* ST131 compared with non-LTCF residents.**
- **Trend coincides with the increasing prevalence of ST131 among patients 65 years and older**

# Causes

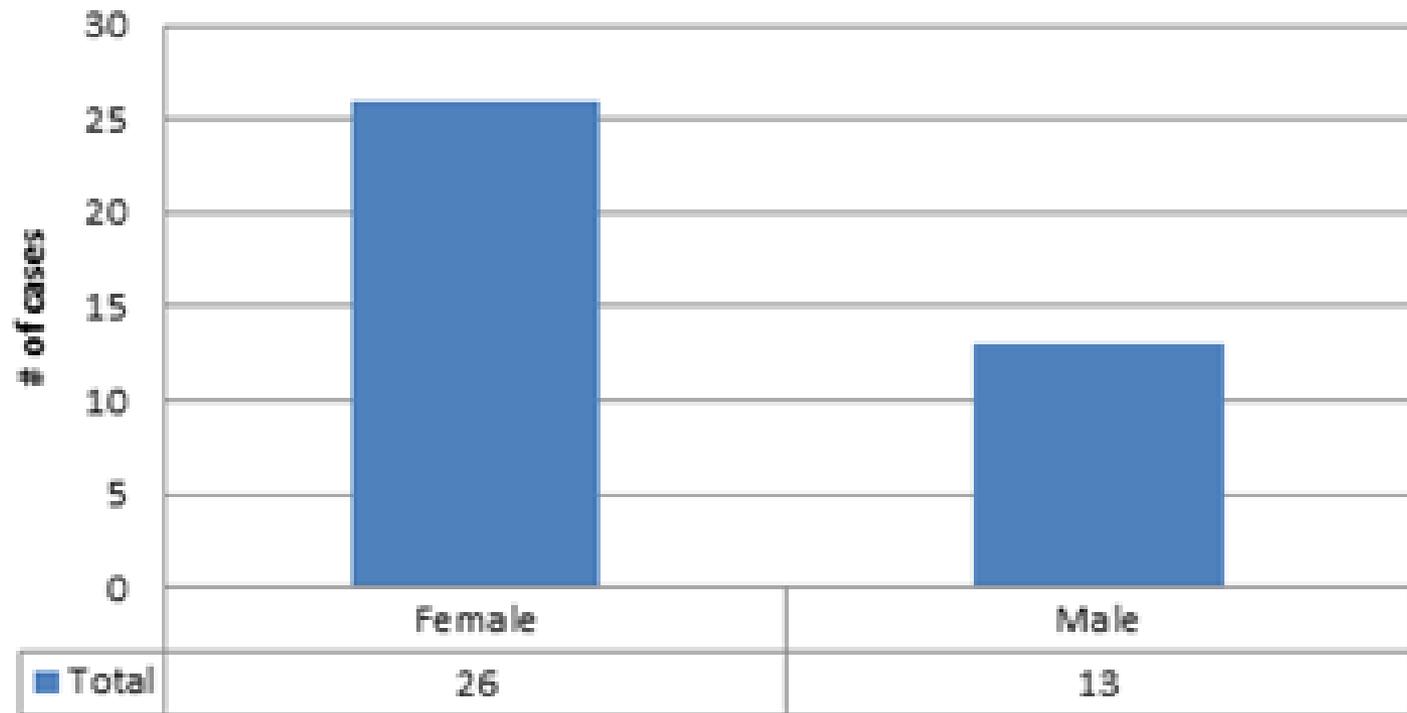
- Extensive antibiotic exposure
- Close contact with other antibiotic-exposed individuals
- Age and health-associated alterations in intestinal microbiota
- All contribute to the high prevalence of ST131 among the elderly population

# Dubbed the 'Nightmare Bacteria'

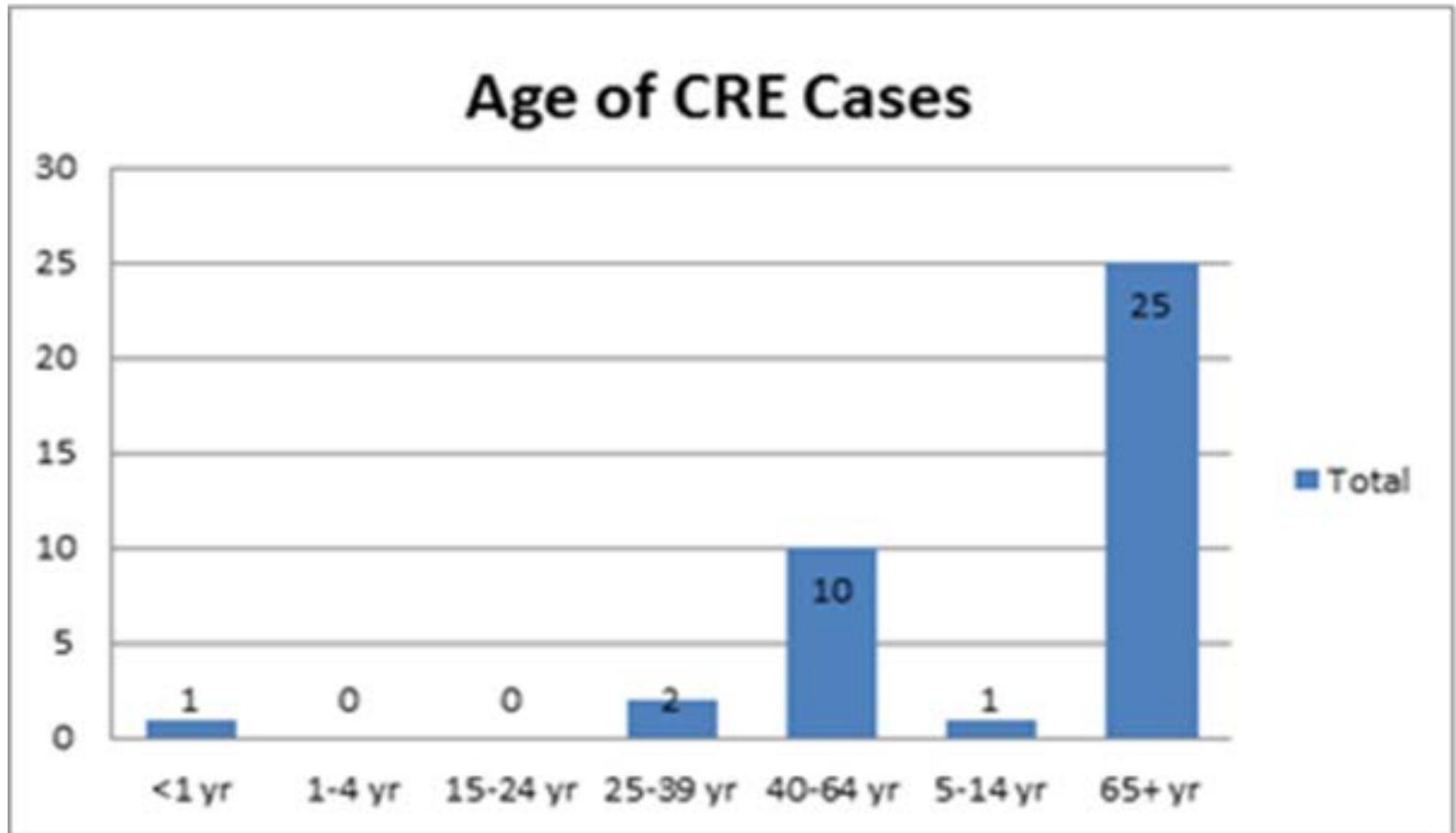
- CDC report: four percent of US hospitals and 18 percent of nursing homes had treated at least one patient with Carbapenem-Resistant Enterobacteriaceae or **CRE** within the first six months of 2012
- CRE are in a family of more than 70 bacteria called Enterobacteriaceae, including *Klebsiella pneumoniae* and *E. coli* that normally live in the digestive system
- In recent years, some of these bacteria have become resistant to last-resort antibiotics known as Carbapemems
- The rapid spread of the bacteria can endanger the lives of patients and healthy people, and in the last ten years the CDC has tracked a particular CRE from one healthcare facility to similar facilities in 42 states

# CRE in SD

## Gender of CRE cases

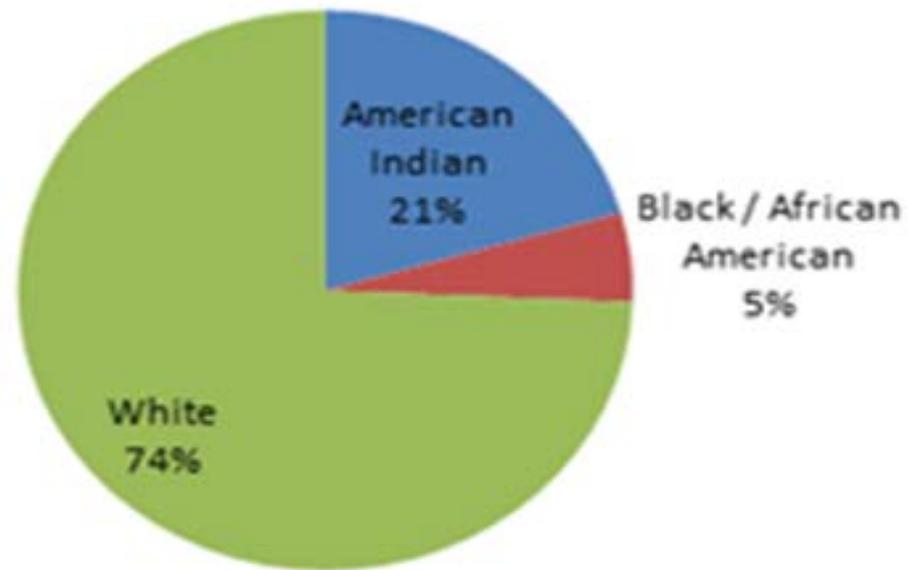


# CRE in SD

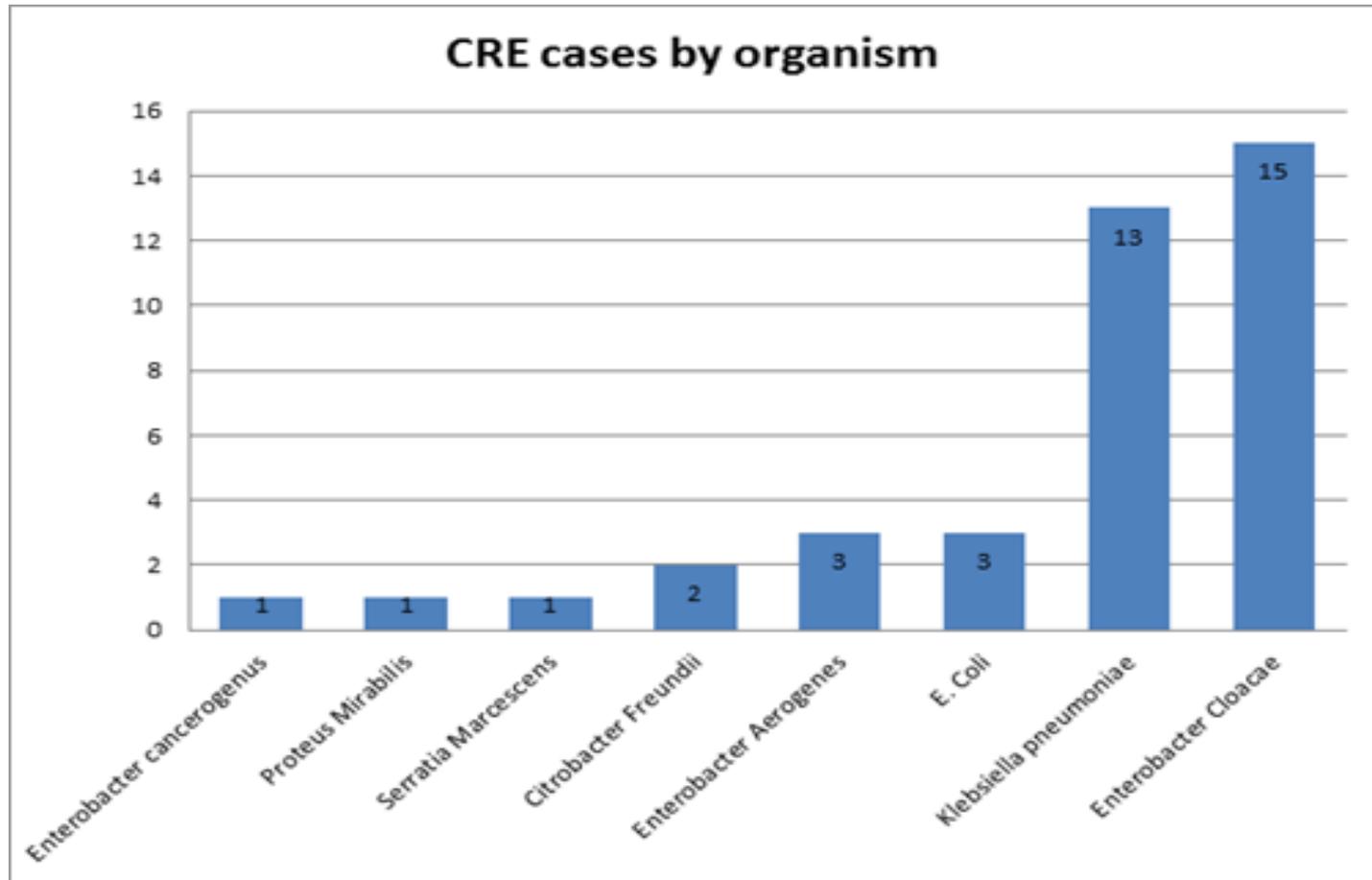


# CRE in SD

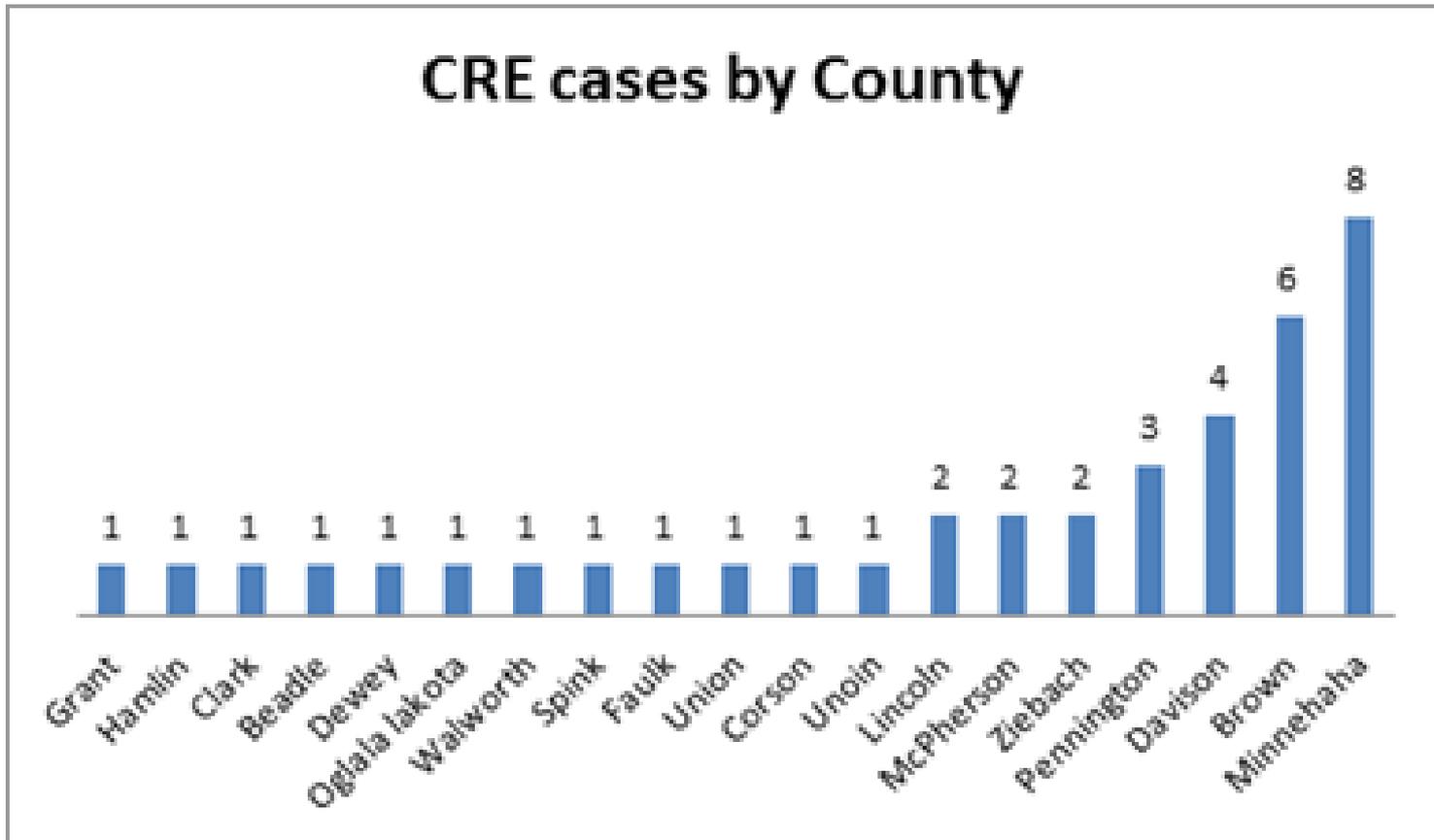
## Race of SD CRE Cases



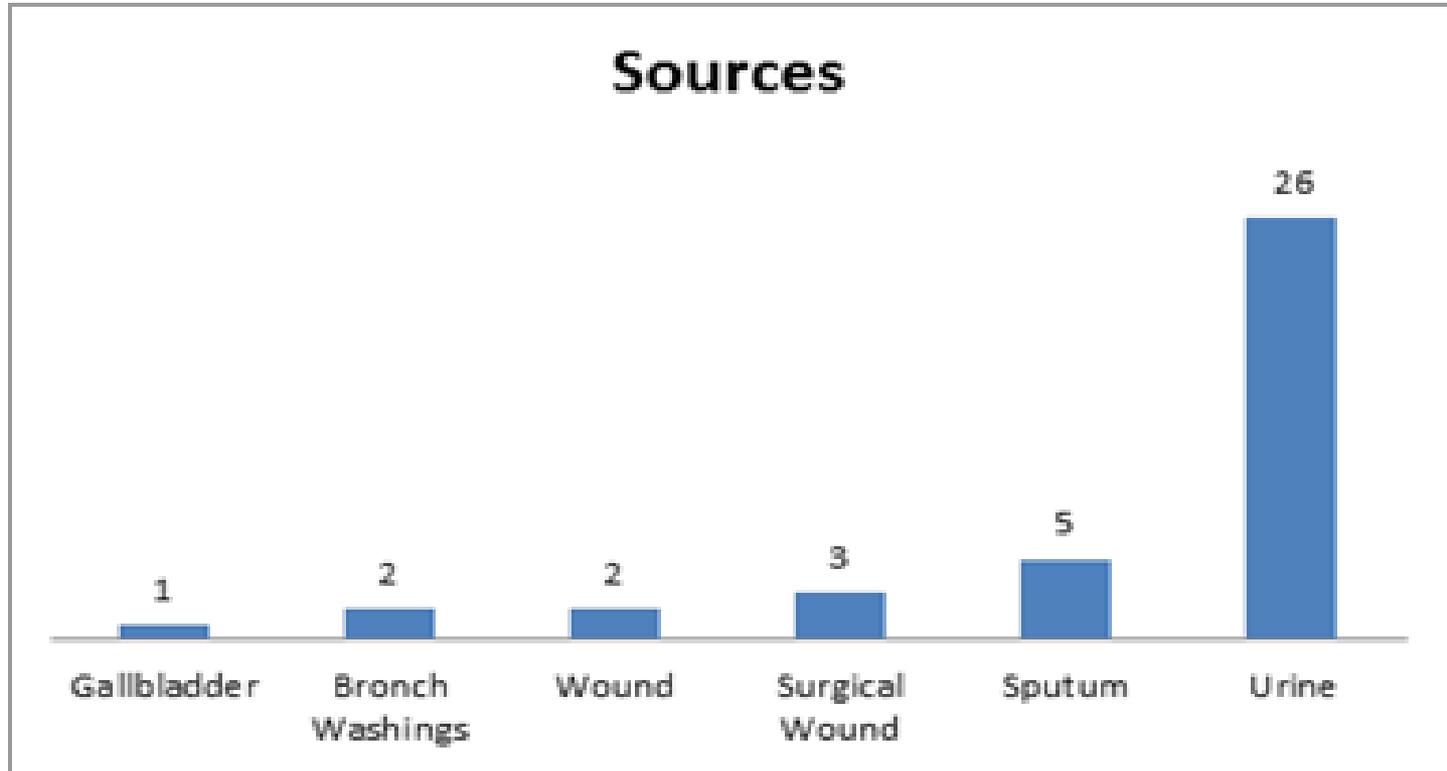
# CRE in SD



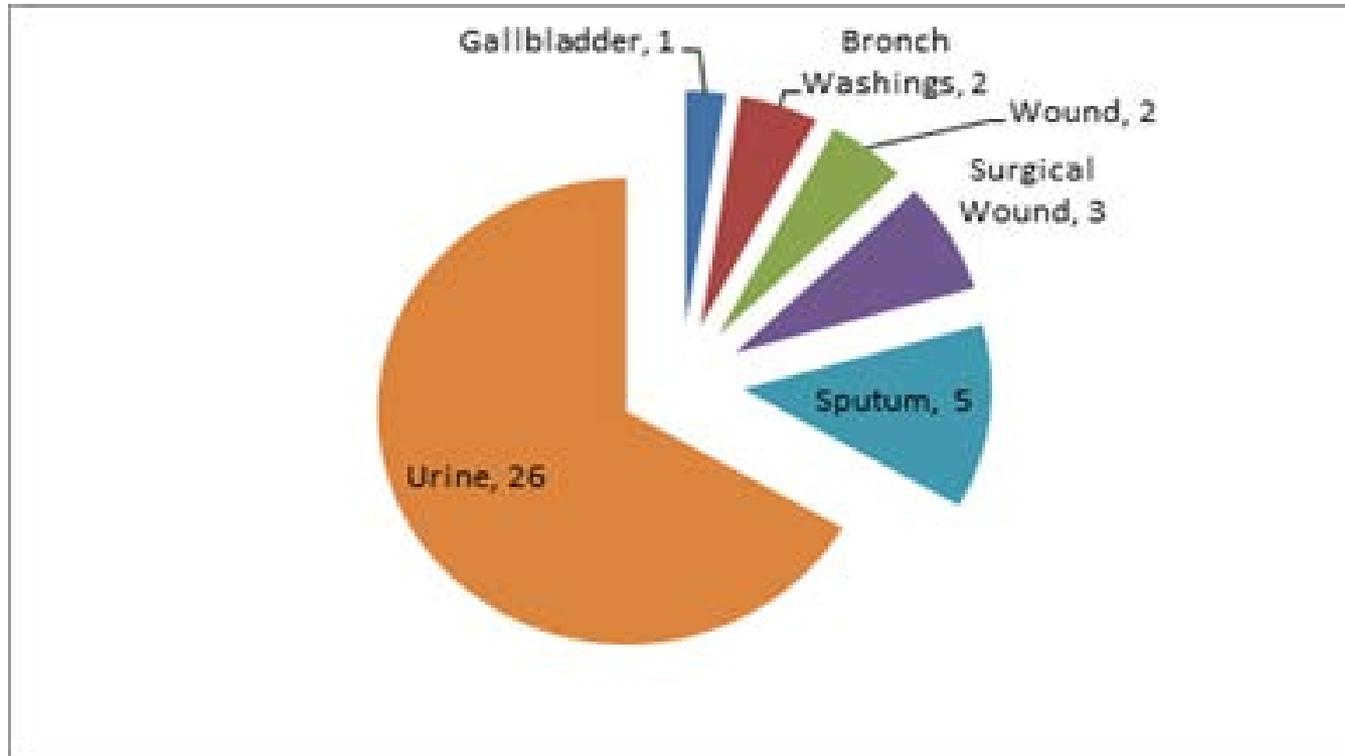
# CRE in SD



# CRE in SD



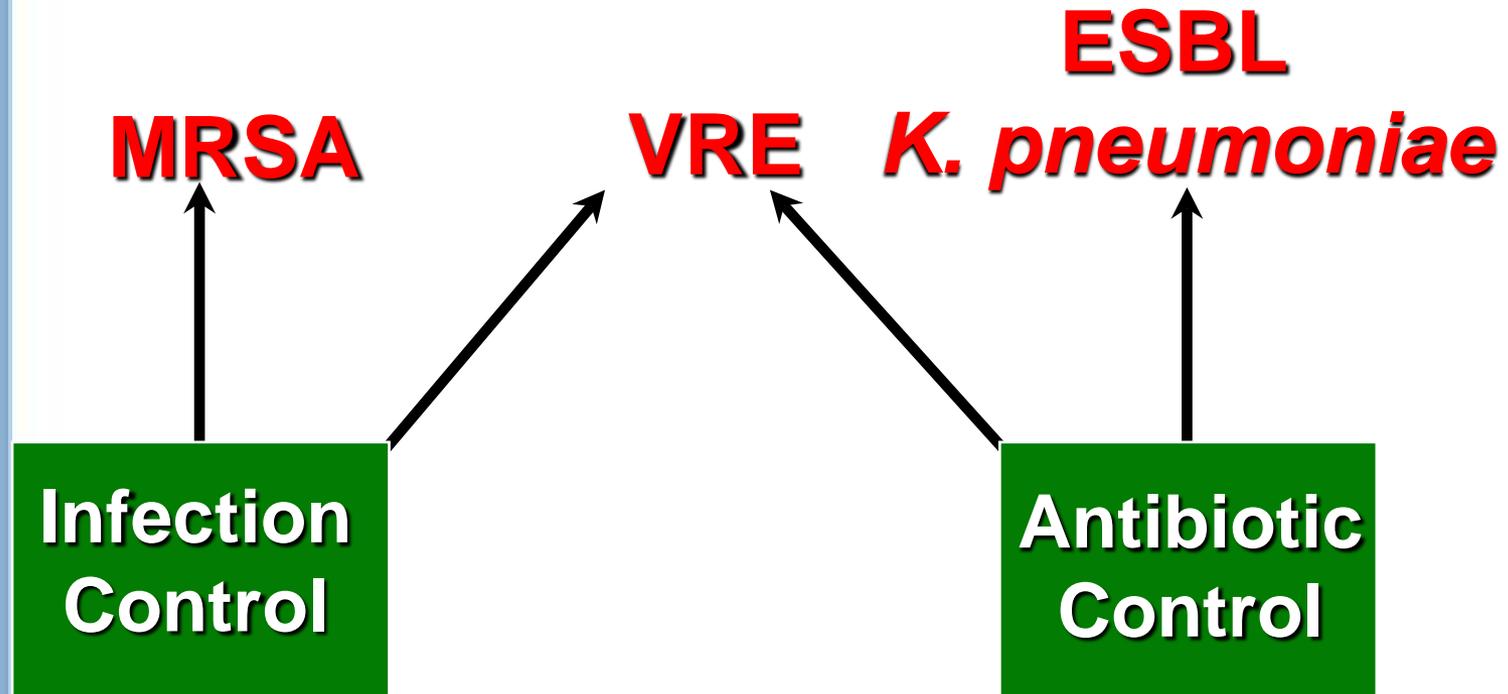
# CRE in SD



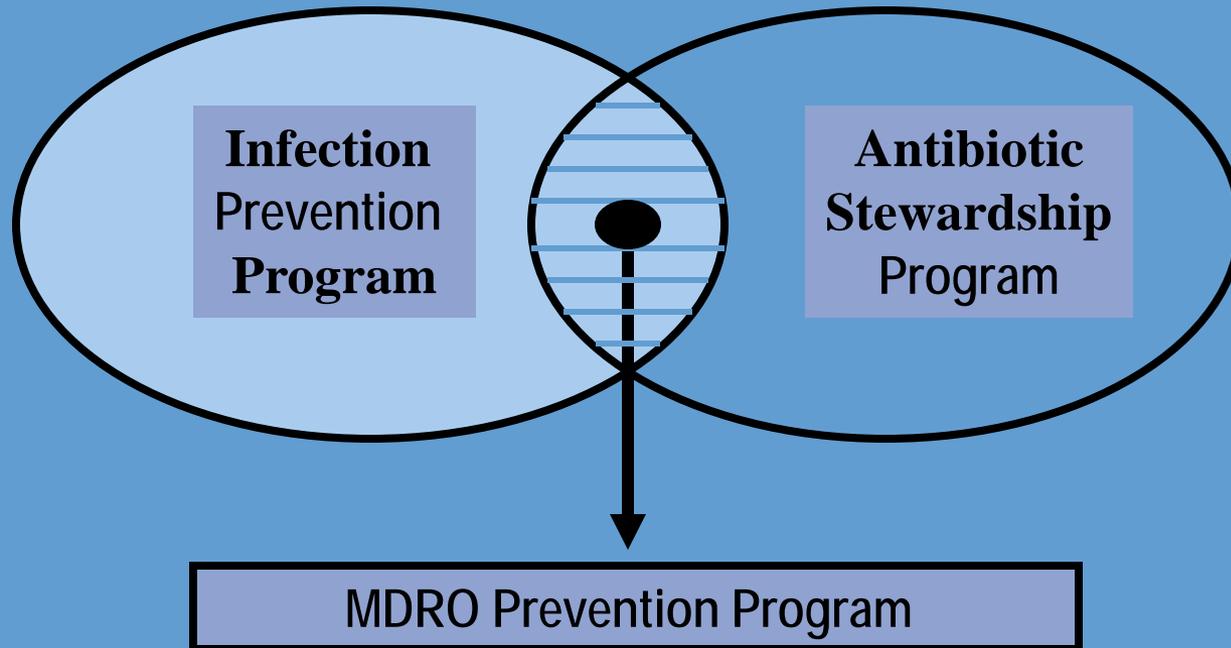
# Be Informed, Be Empowered, Be Prepared

- The US Centers for Disease Control and Prevention said four percent of US hospitals and 18 percent of nursing homes had treated at least one patient with the bacteria called Carbapenem-Resistant Enterobacteriaceae or CRE within the first six months of 2012.
- CRE are in a family of more than 70 bacteria called enterobacteriaceae, including *Klebsiella pneumoniae* and *E. coli* that normally live in the digestive system. In recent years, some of these bacteria have become resistant to last-resort antibiotics known as carbapemens.
- The rapid spread of the bacteria can endanger the lives of patients and healthy people, and in the last ten years the CDC has tracked a particular CRE from one healthcare facility to similar facilities in 42 states.

# Control of Antibiotic Resistance



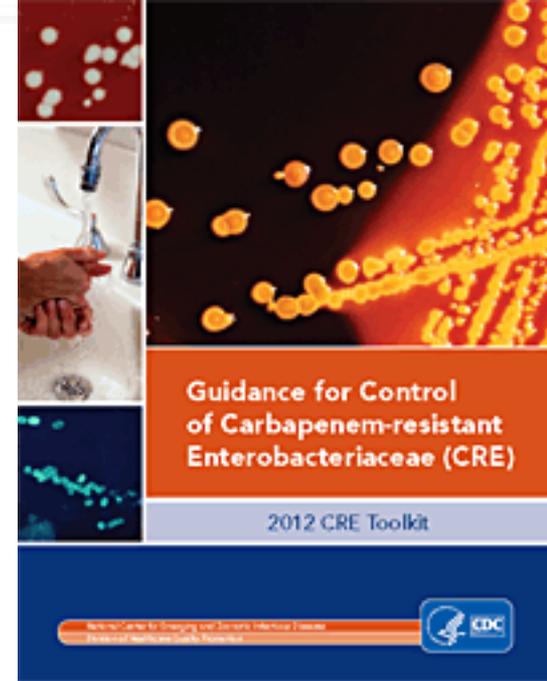
# MDRO Prevention Program



- Optimizes infection control to prevent introduction of MDROs
- Optimizes antimicrobial use to prevent selection of MDROs

# CDC and Infection Prevention

- Enforced infection control practices
- Grouping patients together with CRE
- Segregating rooms, equipment and staff for patients with CRE
- Tell facilities when patients with CRE are transferred
- Use antibiotics appropriately



# **Core Measures for All Acute and Long-term Care Facilities**

**There are 8 core measures facilities should follow**

1. Hand Hygiene
2. Contact Precautions
3. Healthcare Personnel Education
4. Proper use and discontinuation of Devices
5. Patient and Staff Cohorting
6. Lab Notification
7. Antimicrobial Stewardship
8. CRE Screening

# Competent Workforce

- **Understands** how **transmission** occurs
- Able to apply this knowledge in **preventing transmission**
- Recognizes **who** is involved in preventing transmission
- Able to apply the knowledge regarding transmission prevention **in all settings**
- Applies **critical thinking skills** to problem solve
- Actively **collaborates** with others in working toward the goal of transmission prevention

# What can LTCFs Do?

1. Have clear policies and practices to ensure that patients are not started on antibiotics unless they are needed
2. Review the facility's microbiology reports and antibiogram to detect trends in antibiotic resistance
3. Implement policies that encourage prudent antimicrobial prescribing, including establishment of minimum criteria for prescribing antibiotics and review of antibiotic appropriateness and resistance patterns
4. Implement nursing protocols for monitoring patients' status for an evolving condition if there is no specific indication for antibiotics

# What can IPs Do?

- **Develop**: Policies so that antibiotics are used only for as long as needed to treat infections, minimize the risk of relapse, or control active risk to others
- **Educate**: Antibiotics are generally not indicated to treat colonization
- **Inform**: Avoid use of antibiotics to treat viral illnesses such as colds, influenza, and viral gastroenteritis.
- **Engage**: Residents and their family members in addressing the need to improve antibiotic use in your facility.

# Isolation Precautions

- Infection prevention to reduce risk of transmission among residents, staff, families, and visitors
- Standard Precautions
- Transmission-based Precautions used to manage specific, highly transmissible pathogens based on their mode of transmission

# Standard Precautions Recommendations

- Hand hygiene
- Personal protective equipment (PPE)
- Environment of care:
  - Soiled equipment
  - Environmental hygiene
  - Needles and other sharps
  - Textiles and laundry
  - Resident placement

# Transmission-Based Precautions

- Additional infection prevention measures based on route of transmission:
  - Contact
  - Droplet
  - Airborne
- Usually instituted by physician, infection preventionist, director of nursing, according to facility policy

# Intensified Interventions

- Third tier of isolation suggested by CDC under any of the following:
- When highly transmissible pathogen circulating in the LTCF (such as influenza or norovirus)
- When documented transmission of known pathogens has occurred within the LTCF (MRSA, *Clostridium difficile*)
- Pathogen is unusually multi-drug resistant and confirmed by laboratory
- Incidence of specific pathogen increases or fails to decrease despite interventions

# Considerations for Isolation

- Type and duration of isolation precautions for infection
- Equipment and supplies readily available
  - Provide cart, table etc., for PPE
- Signage
  - Proper signage posted outside resident room where it can easily be seen (resident name or pathogen name should NOT be on the sign)
- Hand hygiene and personal care items
- Noncritical care equipment
  - Dedicated equipment
    - Thermometer, stethoscope, gait belt stay in resident room

# Seasonal Influenza

- LTCFs IP Program must include a seasonal influenza plan with vaccination program for residents and staff
- IP should be familiar with steps to take during an influenza outbreak
- LTC IP must comply with national reporting requirements for immunization rates in healthcare personnel and residents

# Influenza Prevention in LTCFs

- Multifaceted approach
  1. Vaccination
  2. Laboratory confirmation
  3. Infection prevention measures
  4. Antiviral treatment and chemoprophylaxis

# Annual Influenza Program in LTCFs

1. Vaccinations begin late summer/early fall
2. Influenza education for residents, visitors, and staff
3. Coordinate LTCF prevention activities with health department
4. Response to a single, confirmed case defined
5. Response to multiple cases (outbreak situation) such as an outbreak notification system

# Occupational Health

- New hires screened to protect residents and staff from communicable diseases
- Employee orientation and training on proper use of PPE
- IP must train and promote hand hygiene as the cornerstone to all interventions
- LTCFs must offer staff recommended vaccines
- Safe injection practices important to protect staff and resident from exposure to infectious disease

# OSHA

- Bloodborne pathogen standards, including requirements, training must be documented and fully understood by all staff
- Exposure control plan available (model plan available on OSHA's website) updated annually
- LTCF considerations: location of sharps containers, cleaning and disinfection of commonly used items, use of engineered safety devices
- Hepatitis B vaccination records
- Post-exposure follow-up

# OSHA Tuberculosis Exposure Control Plan

- Staff exposure to TB can be a challenge in LTCFs
- Key provisions to prevent TB exposure:
- Create a TB exposure control plan
- Review and update annually
- Screen new hire employees and new resident admissions
- Re-screen staff annually
- Train and educate staff upon hiring and annually
- Determine if LTCF meets requirements for respirator fit testing
- TB exposure control plan information and tools:

<http://www.osha.gov/SLTC/etools/hospital/hazards/tb/tb.html>



# CDC Work Restrictions

- A summary of suggested work restrictions for staff exposed to or infected with pathogens of importance to health care settings, in the absence of state and local regulations can be accessed at:
- <http://www.cdc.gov/hicpac/pdf/InfectControl98.pdf>

# Environment and Equipment

- LTCF provides a safe and sanitary environment
- Environment in health care may be a reservoir for infection including bacteria, fungi and viruses
- Cleaning and disinfecting will provide a safe and sanitary environment
- IP serves as important resource for environmental services by providing:
  - Tools
  - Training
  - Education
  - Audits to monitor and maintain infection prevention and control practices

# Cleaning vs. Disinfection

- **Cleaning:** defined as physical removal of dirt and/or organic matter
  - Detergent, water, applied friction
- **Disinfection:** destroys the number of potential pathogens to the point their presence will not cause harm
  - A surface cannot be disinfected unless it has been cleaned first!

# Selection of Products

- Environmental Protection Agency (EPA)—  
approved chemicals only
  - EPA registers products according to their level  
of effectiveness
- Commonly referred to “hospital-grade  
disinfectants” and should be used in  
LTCFs as well

# Important Considerations for Cleaning and Disinfecting Products

1. The circumstances for which the product will be used
  - Check product information for “kill claims” or “label claims” to be sure they meet the needs
2. **Direct Contact Time:** how long does the product need to be in contact with the surface? Need to be sure environmental services observe directions for each type of product

# Cleaning Policies and Schedules

- Core Infection Prevention Programs need to address the following areas:
  - Hand hygiene
  - Use of PPE
  - Use of Isolation Precautions
  - Implementation of standard protocols for environmental hygiene
  - System to regularly monitor effectiveness of cleaning and disinfecting practices

## Comparison of Cleanliness Assessment Methods

METHOD	ADVANTAGES	DISADVANTAGES
<b>Observation and Inspection</b>	<ul style="list-style-type: none"> <li>• Ease of use</li> <li>• Cost-effective</li> <li>• Encourages staff to participate</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to standardize</li> <li>• May be viewed as “punitive”</li> <li>• Results may be impacted by Hawthorne effect</li> <li>• subjective</li> </ul>
<b>Resident Satisfaction Survey</b>	<ul style="list-style-type: none"> <li>• Encourages resident participation</li> <li>• Can include feedback from family/visitors</li> <li>• Minimal cost</li> </ul>	<ul style="list-style-type: none"> <li>• Subjective</li> <li>• Cleanliness emphasized, not disinfection</li> <li>• No benchmarks for comparison</li> </ul>
<b>Environmental Culture</b>	<ul style="list-style-type: none"> <li>• Helpful in outbreaks</li> <li>• Provides quantitative measure</li> </ul>	<ul style="list-style-type: none"> <li>• Not recommended by CDC</li> <li>• High cost to LTCF</li> <li>• Results not available for 48-72 hours</li> </ul>
<b>ATP Luminescence</b>	<ul style="list-style-type: none"> <li>• Easy to use system</li> <li>• Immediate feedback</li> <li>• Helpful for new cleaning methods</li> </ul>	<ul style="list-style-type: none"> <li>• Detection of bioburden not reliable predictor of infection risk</li> <li>• Cost of testing equipment</li> </ul>
<b>Fluorescent Marking Tools</b>	<ul style="list-style-type: none"> <li>• Inexpensive</li> <li>• Easy to do with minimal equipment</li> <li>• Results readily available</li> </ul>	<ul style="list-style-type: none"> <li>• Does not identify pathogens</li> <li>• Only detects if surface cleaned</li> <li>• No quantitative assessment</li> <li>• Staff may see as “policing”</li> </ul>

# Medical Waste

- Medical waste requires careful disposal and containment OSHA mandates biohazard-labeled leak-resistant bags must be used
- National Standard for defining the category known as regulated waste established by:
  - U.S. Environmental Protection Agency
  - U. S. Department of Transportation
  - Occupational Health and Safety Administration
  - United States Postal Service
  - U. S. Public Health Service

# TRANSITIONS IN CARE

- Transferring facilities have strategies in place to maintain optimum infection prevention and control
- Communication and management of multi-drug resistant organisms and other risks are essential
- Strategies and outcomes measured

# Transition Process

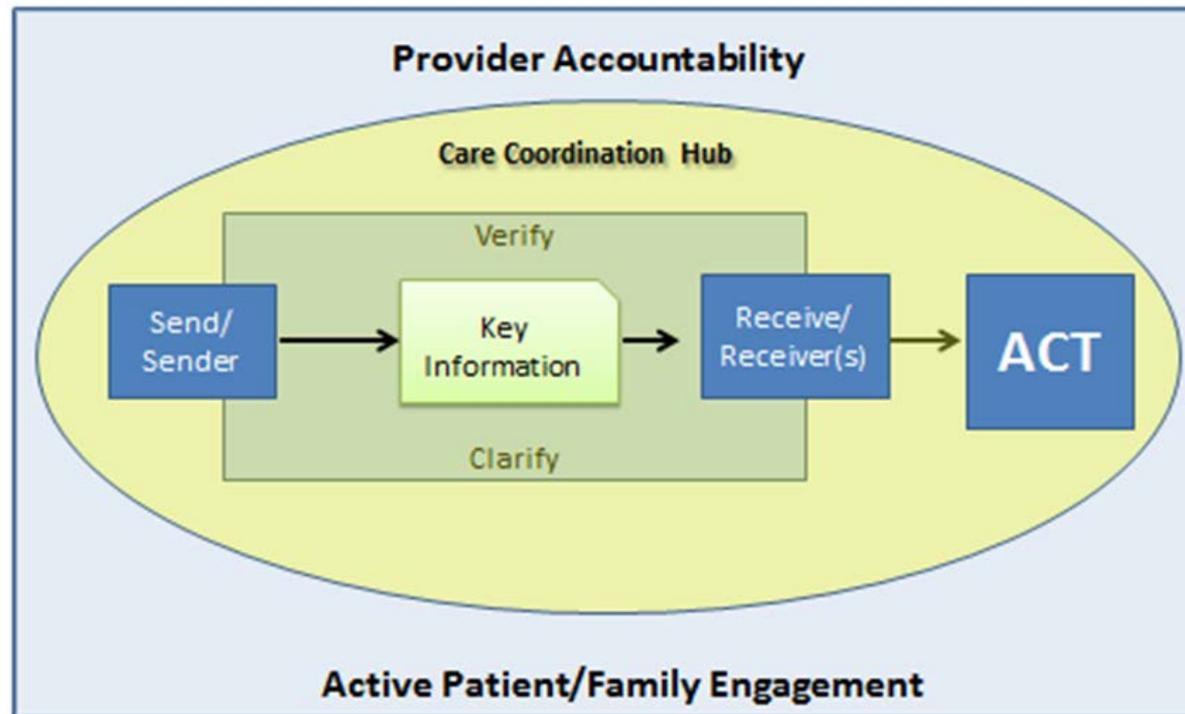
- **Gaps in communication** a big problem
- **Lack of quality communication between acute-care and post-acute care:**
  1. Among healthcare personnel
  2. During transitions between healthcare settings
- **Need for standardization of the discharge process**
  1. Discharge planning
  2. Notice of discharge sufficient
  3. Clarification and education of healthcare personnel roles

# Infection Preventionist Role in Transitions

- MDRO surveillance
- IP/Safety Rounds
- Environmental Monitoring
- Immunization Programs

# Model for Transitions of Care

## Transitions of Care



From National Transition of Care Coalition, 2008. [www.ntocc.org](http://www.ntocc.org)

**South Dakota Inter-facility Infection Control Transfer Form**  
**Please use this form when transferring a patient with Carbapenem-resistant Enterobacteriaceae (CRE)**

*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 No.
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?	Include Colonization or history Check if YES
<b>Carbapenem-resistant Enterobacteriaceae (CRE)</b>	
Clostridium difficile (Cdiff)	
Methicillin-resistant Staphylococcus aureus (MRSA)	
Vancomycin-resistant Entococci (VRE)	
Acinetobacter (Multi-drug resistant)	
E coli, Klebsiella, Proteus etc. w/Extended Spectrum B-Lactamase (ESBL)	
Pseudomonas aeruginosa (CRE ESBL)	

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  |

Printed Name of Person completing form	Signature	Date	If information communicated prior to transfer: Name & phone of individual at receiving facility

For questions, please contact: Angela Jackley, RN Healthcare Associated Infection Coordinator, South Dakota Department of Health, Office of Disease Prevention 605-773-5348 or [Angela.jackley@state.sd.us](mailto:Angela.jackley@state.sd.us). CRE Toolkit: <http://www.cdc.gov/hai/organisms/cre/cre-toolkit/index.html>

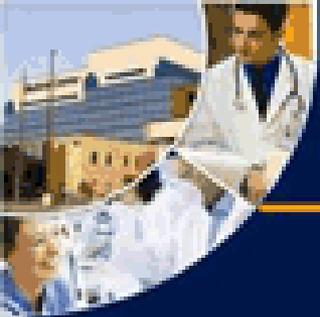
Revised: March 2016

**South Dakota Inter-facility Infection Control Transfer Form**  
**Please use this form when transferring a patient with Carbapenem-resistant Enterobacteriaceae (CRE)**


For questions, please contact: Angela Jackley, RN Healthcare Associated Infection Coordinator, South Dakota Department of Health, Office of Disease Prevention 605-773-5348 or [Angela.jackley@state.sd.us](mailto:Angela.jackley@state.sd.us). CRE Toolkit: <http://www.cdc.gov/hai/organisms/cre/cre-toolkit/index.html>

Revised: March 2016





# Antimicrobial Stewardship: Definition

A system of informatics, data collection, personnel, and policy/procedures which promotes the optimal selection, dosing, and duration of therapy with antimicrobial agents throughout the course of their use.

An effective antimicrobial stewardship program will limit inappropriate and excessive antimicrobial use, but more importantly, will improve and optimize therapy and clinical outcomes for the individual infected patient.

# Rationale for Antimicrobial Use Optimization

- Antimicrobial resistance
  - Inherent
  - Antimicrobial exposure
- Patient safety
  - Arrhythmias, rhabdomyolysis, nephrotoxicity, *Clostridium difficile* infections, death
- Cost
  - Unnecessary use, IV vs. PO, broad-spectrum vs. pathogen-directed therapy



# High Rates of Multidrug-Resistant Organisms in Long-Term Care

- Frequent transfer from acute care hospitals
- Horizontal transmission of resistant organisms
- Widespread (often inappropriate) use of antimicrobials

Schwartz, DN et al., *J Am Geriatr Soc* 2007;55:1236-1242



# Horizontal Transmission

- LTCF today can promote antimicrobial resistant infections and transmission to other high-risk patients
  - Invasive devices and procedures increased
    - Central lines, chronic resp therapy, feeding tubes, dialysis, IV antibiotics
  - Population includes more acute and subacute patients treated previously in hospitals
    - Staff not given appropriate education
  - Changing infection control provider without expertise

Nicolle, LE et al. Antimicrobial Use in LTCFs, *ICHE* 2000; 21: 537-545.



# Antimicrobial Use in Long-Term Care

- Antimicrobials prescribed frequently
  - 40% of all systemic drugs
  - 8% point prevalence
  - 50-70% likelihood resident will receive at least one course of systemic antimicrobials during one year period
  - Contributes to high costs

Zimmer JG et al., *J Am Geriatr Soc* 1986;34:703-710



25-75% of systemic antimicrobial use and 60% of topical antimicrobial use in long-term care is considered **inappropriate**

Nicolle LE, Bentley DW, Garibaldi R, Neuhaus EG, Smith PW. Antimicrobial use in long-term-care facilities. *Infect Control Hosp Epidemiol* 2000;21(8):537–545.

30% of antimicrobial  
use in acute care is  
either inappropriate or  
suboptimal

Cosgrove, SE, SK Seo, MK Bolon, et al. *Infection Control and Hospital Epidemiology*, Vol. 33, No. 4, Special Topic Issue: Antimicrobial Stewardship (April 2012), pp. 374-380.



# Take Home Message

Antibiotic exposures and infection control measures in the hospital influence residents' health at LTCFs.

Antibiotic exposures and infection control measures in the LTCF influence patient's health when they are in the hospital.

# Clinical Example:

## Asymptomatic bacteriuria

- $\geq 10^5$  colony forming units is often used as a diagnostic criteria for a positive urine culture
- It does NOT prove infection; it is just a number to state that the culture is unlikely due to contamination
- Pyuria also is not predictive on its own
- It is the presence of symptoms AND pyuria AND bacteruria that denotes infection



# Treatment of Asymptomatic Bacteriuria in the Elderly

**Multiple prospective randomized clinical trials have shown no benefit**

- No improvement in “mental status”
- No difference in the number of symptomatic UTIs
- No improvement in chronic urinary incontinence
- No improvement in survival



# Summary of Asymptomatic Bacteriuria Treatment

- Treat symptomatic patients with pyuria and bacteriuria
- Don't treat asymptomatic patients with pyuria and/or bacteriuria
- Define the symptomatic infection anatomically
- Dysuria and frequency without fever equals cystitis
- Dysuria and frequency with fever, flank pain, and/or nausea and vomiting equals pyelonephritis

# Antimicrobial Movement in the Healthcare Setting

Patient Evaluation



Choice of Antimicrobial



Prescription Ordering



Dispensing Antimicrobial

# Difficulties in Patient Evaluation in Long-Term Care

- Clinical diagnosis of infection is imprecise
  - Symptoms not expressed or misinterpreted
    - Hearing and cognition impairment
    - Comorbid medical illness may obscure infection
  - Febrile response may be relatively impaired
  - Fever without source is frequent
  - Limitations in resources to support clinical assessment

Nicolle, LE et al. Antimicrobial Use in LTCFs, *ICHE* 2000; 21: 537-545.

# Difficulties in Patient Evaluation in Long-Term Care

- Limited availability and use of laboratory and radiological testing
  - Leads to empiric treatment
- Evidenced-based recommendations on use of antimicrobials in LTCFs are limited
  - Based on clinical criteria targeted for younger populations with less complex problems
  - Optimal treatment regimens have not been defined

Nicolle, LE et al. Antimicrobial Use in LTCFs, *ICHE* 2000; 21: 537-545.



# ASP Strategies

Patient Evaluation



Choice of Antimicrobial



Prescription Ordering



Dispensing Antimicrobial

• Education/Guideline

• Formulary Restriction and Pre-authorization

• Computer-assisted strategies

• Review and Feedback

# ASP Strategy Selection

- Facility dependent
  - Beds and acuity of care
  - Dedicated personnel
  - Funds
  - Pharmacy support
  - Electronic systems
  - Laboratory support



**Infection Control  
Department**

**Pharmacy**

**Director,  
Information  
Systems**

**Microbiology**

**Antimicrobial  
Stewardship  
Program**

**P&T Committee**

**Infectious  
Diseases Division**

**Patient Safety**

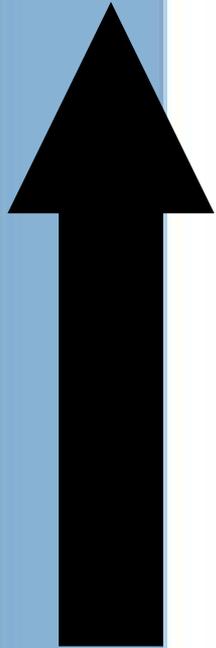
**Hospital  
Leadership**



# Stewardship Hierarchy in LTCF

## Most Intrusive

Requires most expertise, effort and expertise.



<p>“Back End” approach – Review of already prescribed antibiotics</p>	<p>Individual cases are concurrently reviewed for appropriateness, usually by an expert, with feedback to the provider.  Individual use data with comparators and benchmarks is provided to prescribers regarding appropriate use.</p>
<p>“Front End” approach—Active direction of antibiotic selection</p>	<p>Preauthorization of antibiotics based upon predetermined criteria.  Review of case and immediate feedback on choice of antibiotics at initiation.</p>
<p>“Front End” approach—Passive direction of antibiotic selection</p>	<p>Guidelines, treatment algorithms, antibiotic formulary, antimicrobial order forms</p>
<p>Education</p>	<p>Classes or training sessions regarding antibiotic resistance, stewardship practices, etc. offered to LTCF employees or staff. Small group sessions with prescriber feedback and case discussions.</p>
<p>Passive monitoring</p>	<p>Measuring types and quantities of antibiotics used in the facility, and the presence of antimicrobial resistance in cumulative laboratory culture and sensitivity reports.</p>

## Least Intrusive

Requires least expertise, effort and expense

# Criteria for Selecting Cases for ASP Review

- High cost agents
- Broad-spectrum agents (eg. FQs, Pip/Tazo)
- Site of infection (eg. CLABSI)
- Resistance profiles (eg. MDROs, MRSA)
- High risk of adverse effects (eg. Amphotericin)
- Novel agents
- **Syndromic approach (eg. asymptomatic bacteriuria)**
- High use agents (facility dependent)
- Double coverage of organisms (eg. anaerobes)

# Syndromic Approach

- Useful in LTCFs to identify problem area and focus interventions:
  - Asymptomatic bacteriuria: positive urine cultures in absence of clinical signs/symptoms
    - Treatment indicated in pregnancy and after GU tract manipulation only
    - Multiple treatments often given in elderly
      - RCTs have shown no benefit
      - Does not decrease occurrence of symptomatic infection, chronic symptoms or alter mortality
      - Can lead to unnecessary adverse drug effects and colonization with MDROs

# Asymptomatic Bacteriuria in Elderly

- 5-50% of elderly patients in LTCFs have bacteriuria
- Over 90% of elderly with bacteriuria have pyuria
  - No evidence of poor clinical outcomes with high levels of pyuria
    - Some individuals high levels of pyuria  $>1000$  WBCs/mm<sup>3</sup> of urine
      - May persist for months or years

# ASPs

- Optimization of antimicrobials is imperative:
  - Minimize resistance
  - Improve patient safety
    - Reduce healthcare costs
- Must be implemented across healthcare continuum
  - ASPs essential in LTCF
    - High rates of resistance, poor infection control, overuse of antimicrobials

# ASP in LTCF

- Education strategies must include nurses, patients, and their families
- Criteria such as syndromic approach may be “low hanging fruit”
  - Eg., Pneumonia or UTI
- ASP interventions must be tailored to the environment

# ASP in LTCF Recommendations

- Incorporate multidisciplinary antimicrobial utilization review into infection control programs
  - Evaluate antimicrobial use
  - Conduct regular review of surveillance data
  - Implement ASPs in step-wise approach
    - Require indication for antimicrobial use in treatment plan
    - Conduct educational sessions with clinical staff
    - Implement guidelines for antimicrobial use

# Recommendations: Partnership

- Hospitals and long-term care should work together to improve antimicrobial use and infection control across facilities
  - Improve interfacility communication
    - Interfacility transfer form
  - Share resources
    - ID, infection control and PharmD expertise
- Goal is a standardized regional approach to ASP implementation and infection control

**Resources for the Infection Preventionist:  
See Handout for Additional Resources and Links**

**Links available on the SD HAI webpage at  
<http://doh.sd.gov/diseases/hai/> under training and  
resources**

# Infection Prevention in LTC



Infection  
Preventionist's Guide

to Long-Term Care



- Go-to reference for all stages of the Infection Preventionist career:**
- a comprehensive approach to developing a facility-based infection prevention program
  - numerous practical tips and clinical advice for successful implementation

