Health Care-Associated Infections And Antimicrobial Resistance

Section 4

Section 4: HAIs and Antimicrobial Resistance

Health Care-Associated Infections Background

The Centers for Disease Control and Prevention (CDC) estimates that on any given day, 1 in 31 hospital patients has a Health Care-Associated Infection (HAI). Florida has a large system of health care facilities providing care to residents and visitors. There are **315** licensed inpatient hospitals with **213** having emergency departments. There are **473** ambulatory surgery centers, **694** nursing homes and **3,090** licensed assisted living facilities in Florida.

HAI Infection Control Assessment Responses (ICARs)

The CDC designed the Infection Control Assessment Response (ICAR) to assess a facility's capability to identify, isolate, inform, prepare for transport and provide care for persons with highly infectious diseases, such as Ebola. An ICAR program was started in Florida in 2017 to conduct non-regulatory infection control assessments in collaboration with all health care facilities. Assessments review infection control policies and conduct direct observations (e.g., hand hygiene, personal protective equipment, environmental cleaning, patient care, device reprocessing, etc.) Through the duration of the ICAR program, **77** ICARS were conducted by the county representative ICAR epidemiologist with help of the state ICAR epidemiologist. **18** of these ICARS were in response to an outbreak of multidrug-resistant organisms across multiple health care settings.

HAI Carbapenem-Resistant Enterobacteriaceae Collaborative

The HAI Prevention Program has been facilitating collaboratives since its start in 2010. Collaboratives serve as a way to engage health care facilities in infection prevention of important organisms. Facilities are provided with education and training, networking opportunities and on-site assessments. Through the data collected during collaboratives, FDOH is able to measure the impact of interventions and target regions needing further support.

Carbapenem-resistant Enterobacteriaceae (CRE) are a family of highly drug-resistant organisms that include *Klebsiella*, *Escherichia coli (E. coli)*, and *Enterobacter* species. CREs are considered an immediate public health threat that require urgent, aggressive action. The CDC estimates that these organisms cause 9,000 drug-resistant infections and 600 deaths per year. They are found in the normal gut flora and may cause urinary tract infections, wound infections, pneumonia, septicemia and meningitis. The goals of the CRE collaborative were to increase awareness and patient education on how to prevent CRE infections, improve detection and surveillance for CRE, determine prevalence of CRE in the Miami-Dade region, to improve communication between health care facilities and transport companies on preventing the spread of CRE and to promote antibiotic stewardship initiatives.

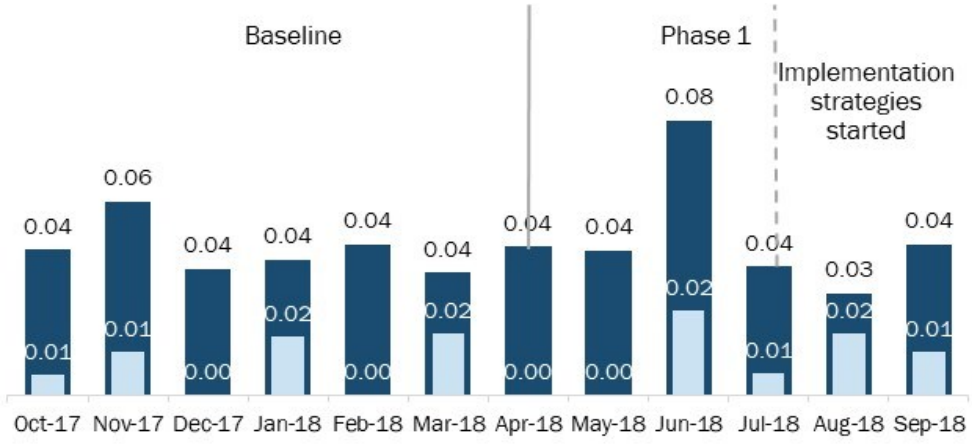
The overall CRE prevalence rate for the collaborative was 0.045 per 100 patient admissions, with the highest rate in June 2018 (0.081). The overall CRE admission prevalence rate was 0.01 per 100 patient admissions with the highest rate (0.025) seen in the month of June 2018.

CRE prevalence rate

Prevalence rate of patients who had CRE among any admission diagnosis.

CRE admission prevalence rate

Prevalence rate of patients who were admitted for a CRE diagnosis.



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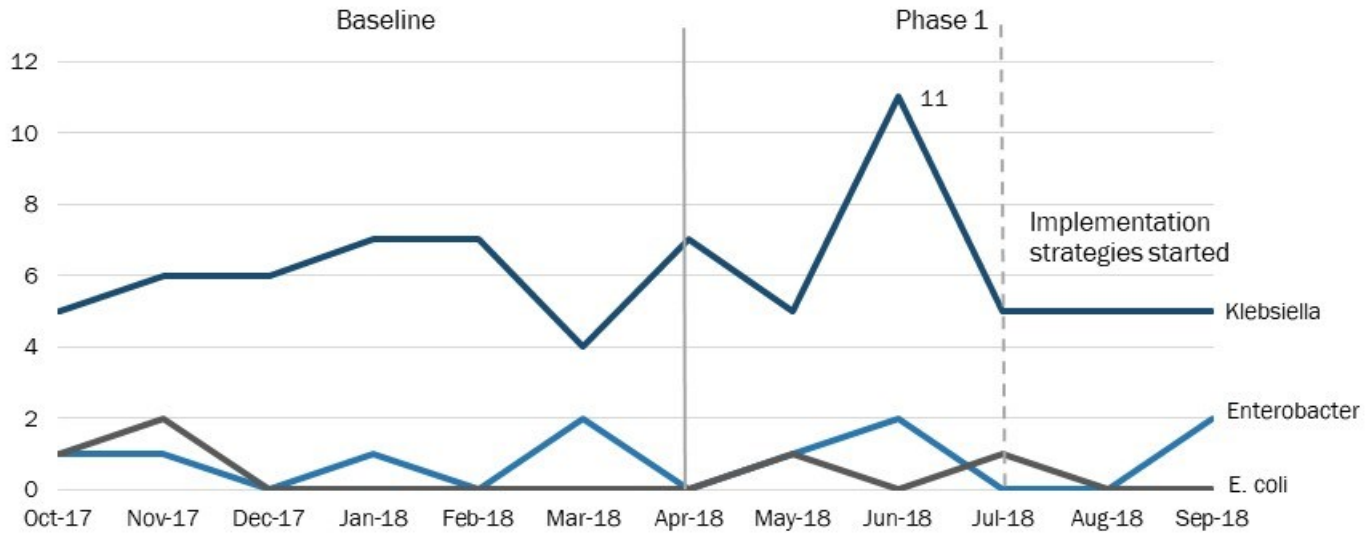
The last month of data submitted for the collaborative was September 2018 which equaled a full year worth of data. ***Klebsiella* species were the most commonly reported** at both baseline and Phase 1 with a total of 73 infections while eight *Enterobacter* and seven *E.coli* infections were reported. The overall incidence density rate was 0.053 per 1,000 patient days with the highest rate seen in June 2018.

88 CRE infections were reported
55 infections were hospital-onset
33 infections were community-onset



Antimicrobial Resistance

Antimicrobial resistance is the ability of a microorganism to evade antimicrobial treatment. One reason microorganisms have become resistant to antibiotics is that they are often inappropriately used to treat infections with the wrong dose, duration or drug choice. Giving antibiotics to food animals can also foster resistance in bacteria. Infections caused by drug-resistant organisms are difficult to treat and often require extended hospital stays, treatment with more toxic drugs and increased medical costs.

Over the past few years, antimicrobial resistance has become an urgent public health threat affecting the health care, veterinary and agricultural industries, fueled by modern globalization. The HAI Prevention Program works with local, state and federal partners to implement containment strategies designed to stop the spread of antimicrobial-resistant organisms through early and aggressive action. Improving infection control practices, reducing overuse and improper use of antibiotics, tracking and reporting resistance rates, improving laboratory capacity and developing new drugs can reduce antimicrobial resistance. Surveillance data are used to identify occurrences of novel resistant organisms, analyze trends over time, target facilities for interventions to improve antibiotic prescribing and guide empiric therapy.

Case-based surveillance

Health care providers and laboratories must report antimicrobial resistance testing results to FDOH for:

- *Streptococcus pneumoniae* isolates from normally sterile sites, such as blood or cerebrospinal fluid
  - ◊ Only laboratories participating in electronic laboratory reporting (ELR) are required to submit such results for people ≥6 years old. All laboratories are required to submit test results for children <6 years old.
- *Staphylococcus aureus* isolates that are not susceptible to vancomycin
- *Mycobacterium tuberculosis*
  - ◊ Specimens for all tuberculosis cases must be forwarded to the FDOH Bureau of Public Health Laboratories (BPHL) for *M. tuberculosis* testing; all positive samples undergo a rapid test for isoniazid and rifampin resistance.
  - ◊ For information on *M. tuberculosis* resistance, see Section 1: Data Summaries for Common Reportable Diseases/ Conditions.

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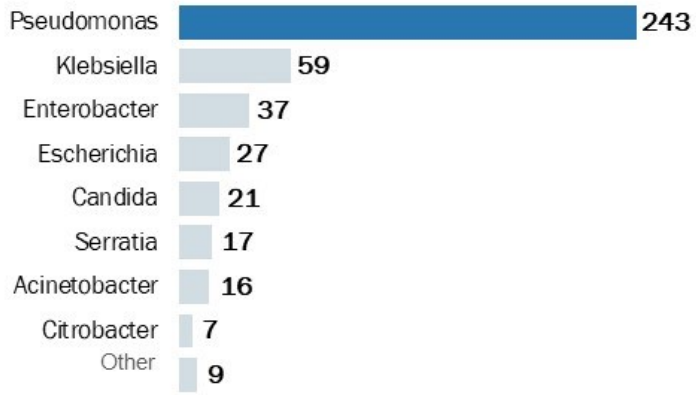
Laboratory Testing

To further improve surveillance and awareness of CRE, FDOH's BPHL expanded CRE testing capabilities to identify types of resistance mechanisms used by organisms. Carbapenemase production is a resistance mechanism of concern. A carbapenemase is an enzyme that breaks down carbapenem antibiotics and can be transferred between organisms. A variety of carbapenemases have been reported in the U.S. and in Florida—*Klebsiella pneumoniae* carbapenemase (KPC), Verona integron-encoded metallo-β-lactamase (VIM), New Delhi metallo-β-lactamase (NDM) and oxacillinase (OXA)-48-like.

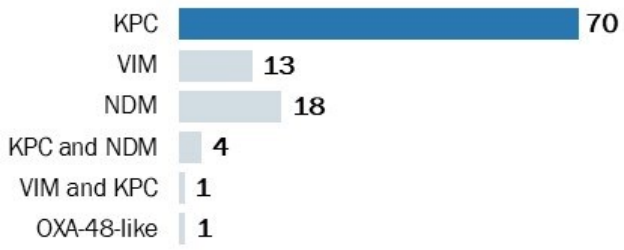
Electronic laboratory reporting (ELR) surveillance

All laboratories participating in ELR must report antimicrobial resistance testing results for all *Acinetobacter baumannii*, *Citrobacter* species, *Enterococcus* species, *Enterobacter* species, *Escherichia coli*, *Klebsiella* species, *Pseudomonas aeruginosa*, *Serratia* species and *S. aureus* isolates from normally sterile sites. Resistance results are processed electronically in the state's reportable disease surveillance system.

484 isolates tested by BPHL for CRE mechanism in 2018



25% of isolates tested were carbapenemase-producing



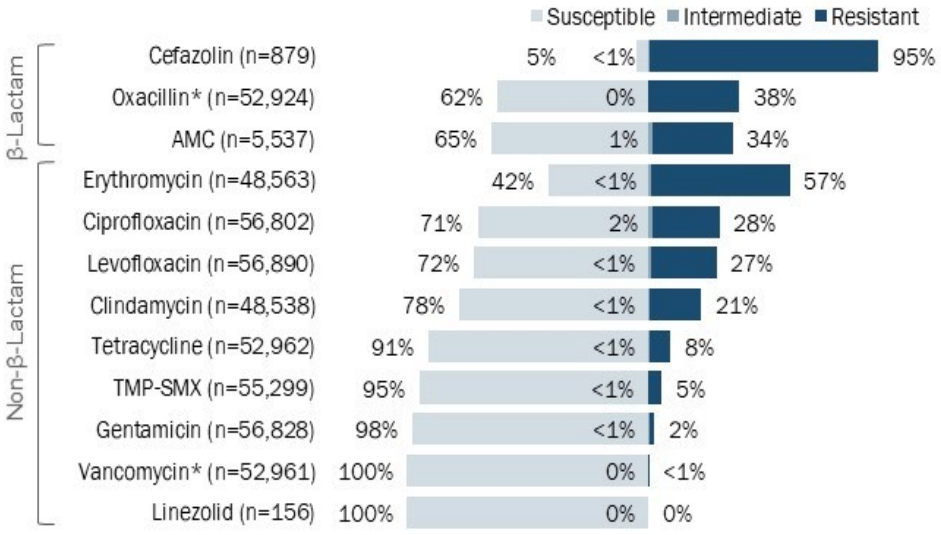
Antimicrobial Resistance Key Points

S. aureus species in 2018

58,355 isolates reported

38% resistant to oxacillin (i.e., MRSA). Susceptibility testing now done on oxacillin rather than methicillin.

0% resistant to vancomycin. Recommended first-line antibiotic when resistant to oxacillin.



AMC=amoxicillin/clavulanate
TMP-SMX=trimethoprim/sulfamethoxazole
* Recommended first-line antibiotics, according to *The Sanford Guide to Antimicrobial Therapy 2018*

Organism Facts

- Gram-positive bacterium, often part of body's normal flora, frequently found in nose, respiratory tract and on skin
- Leading cause of skin and soft tissue infections
- Transmitted via direct contact

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Acinetobacter species in 2018

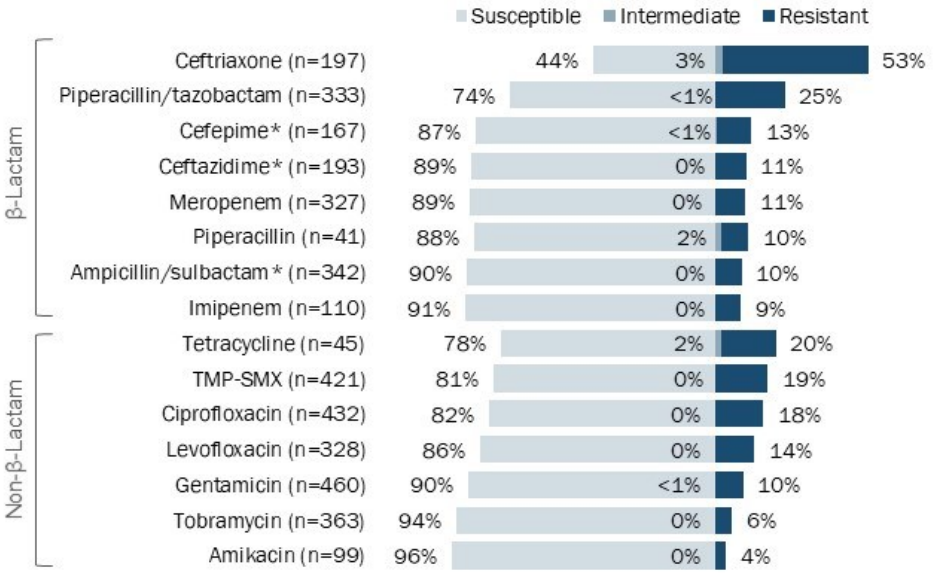
504 isolates reported

11% resistant to one or more carbapenems (doripenem, ertapenem, imipenem, meropenem)

10–13% resistant to recommended antibiotics (cefepime, ceftazidime, ampicillin/sulbactam)

Organism Facts

- Gram-negative bacteria, frequently found in soil and water; *A. baumannii* is most common species causing disease in humans
- Causes pneumonia, blood infections, meningitis, urinary tract infections, skin or wound infections
- Transmitted via direct contact



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Note: indeterminate results not included in this figure

Streptococcus pnuemoniae species in 2018

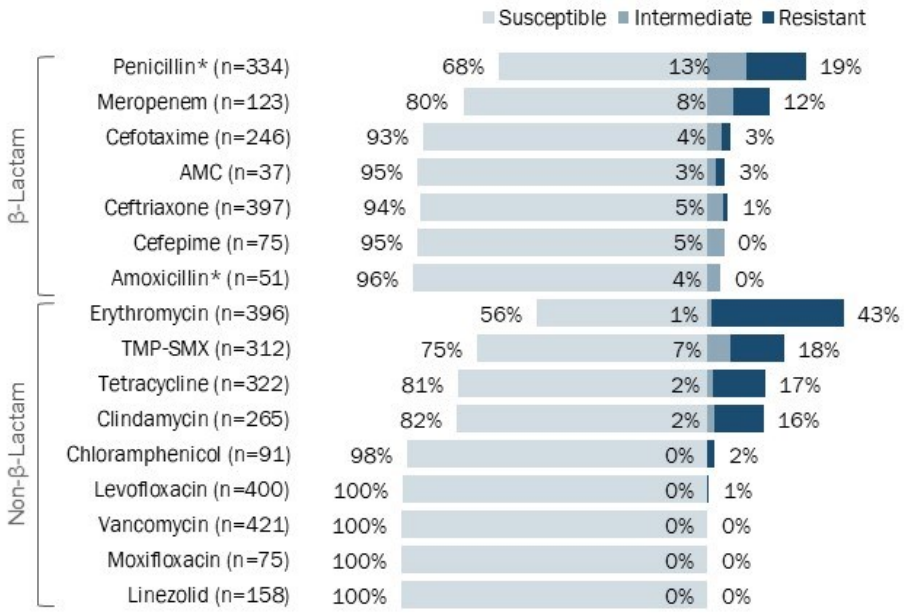
758 S. pneumoniae invasive disease cases reported

40% had isolates resistant to at least one antibiotic

19% resistant to penicillin and **0%** resistant to amoxicillin (recommended first-line antibiotics)

Organism Facts

- Gram-positive, facultative anaerobic bacterium
- Major cause of pneumonia and meningitis
- Transmitted via direct contact



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Antimicrobial Resistance Key Points (Continued)

Escherichia coli in 2018

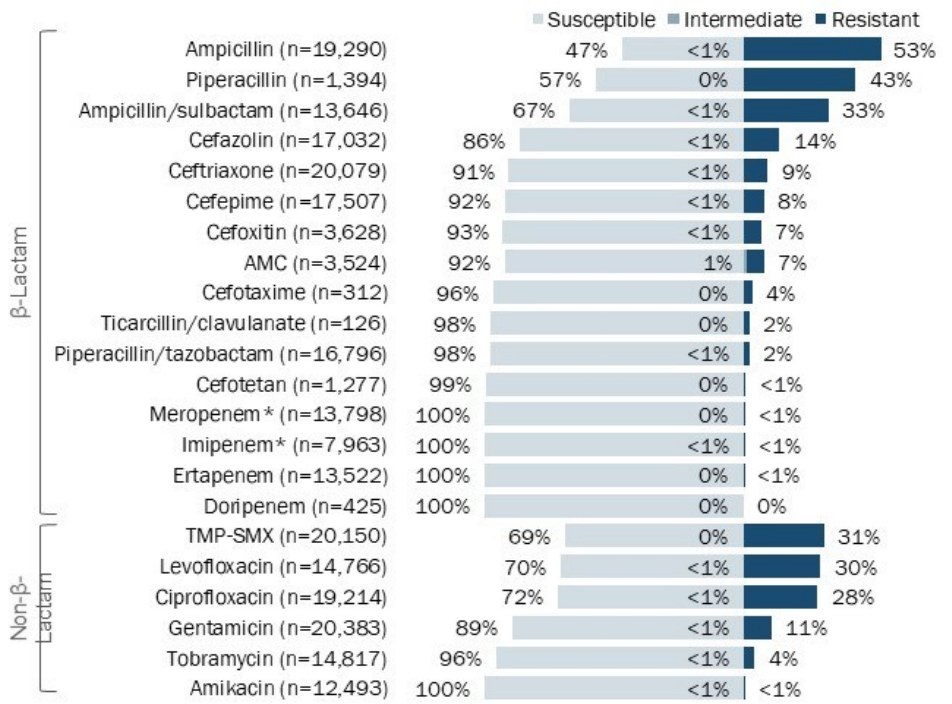
20,933 isolates reported

0.2% resistant to one or more carbapenems (i.e., CRE)

<1% resistant to imipenem or meropenem (recommended first-line antibiotics)

Organism Facts

- Gram-negative, facultative aerobic bacterium, frequently found in lower intestine
- Cause of food poisoning, pneumonia, breathing problems, and urinary tract infections
- Transmitted via fecal-oral route



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*Recommended first-line antibiotics, according to *The Sanford Guide to Antimicrobial Therapy 2018* Note: indeterminate results not included in this figure

Klebsiella species in 2018

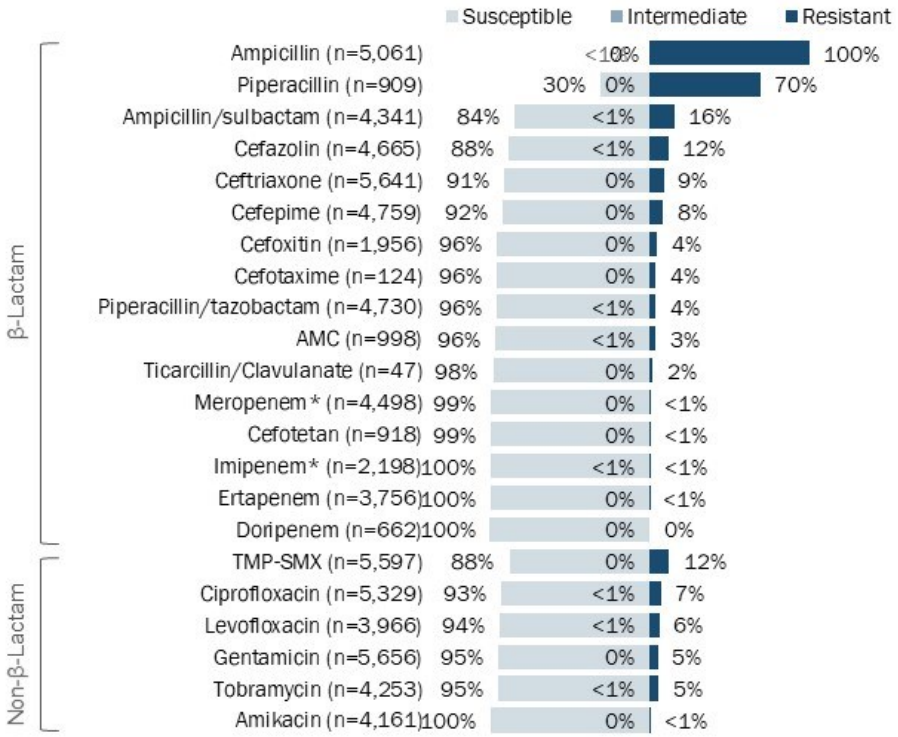
5,908 isolates reported

0.8% resistant to one or more carbapenems (i.e., CRE)

<1% resistant to imipenem or meropenem (recommended first-line antibiotics)

Organism Facts

- Ubiquitous, gram-negative bacteria; *K. oxytoca* and *K. pneumoniae* are most common species causing disease
- Causes food poisoning, pneumonia, breathing problems, urinary tract infections
- Transmitted via direct contact



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Antimicrobial Resistance Key Points (Continued)

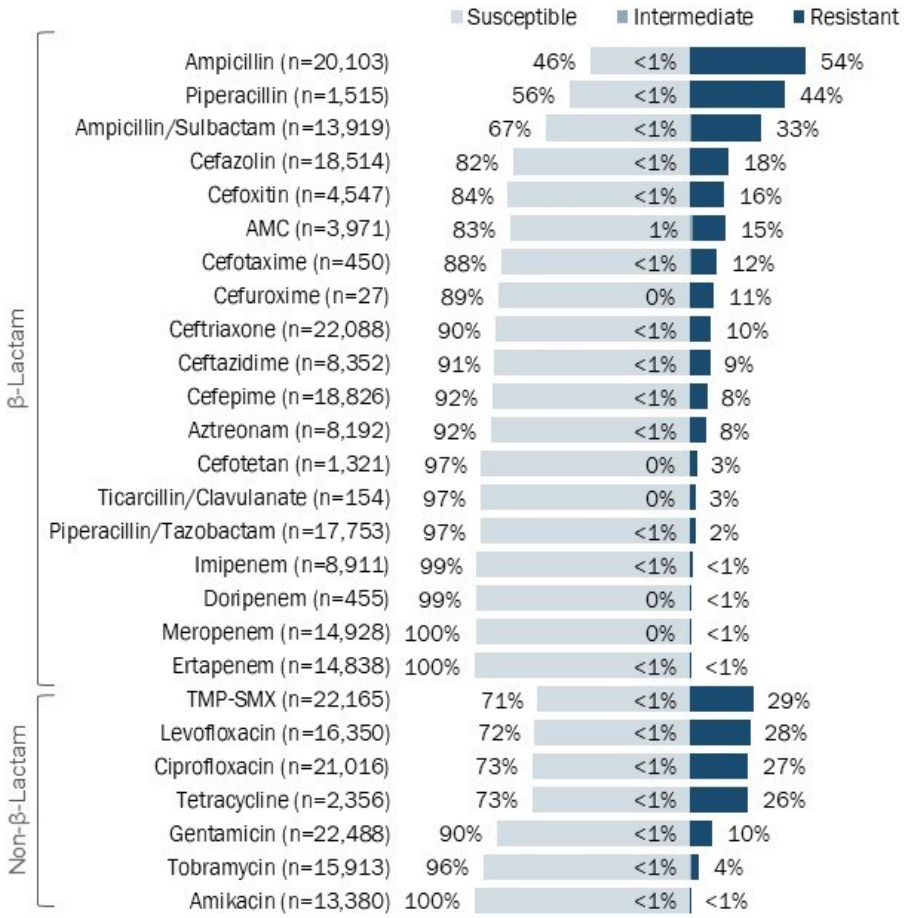
Enterobacteriaceae in 2018

28,166 isolates reported

0.6% resistant to carbapenem (i.e., CRE)

Organism Facts

- Family of bacteria that includes *Escherichia coli*, *Klebsiella pneumoniae*, *Salmonella* species and *Shigella* species
- Often occur in health care settings in patients who require devices or antibiotic therapy
- Transmission depends on organism



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