City of Amarillo Public Health

Monthly Update and Newsletter

The Epi Link

What is antibiotic resistance?

It is what happens when a disease-causing bug like a bacteria or fungus develops a way to stop an antibiotic – the medicine used to kill the bug – from working.

Why is antibiotic resistance a concern? Often the antibiotics that stop working are the last resort medicine for a person that is ill. Resistant bugs can make it very difficult and expensive for the doctor to determine how to treat the patient.

Other times, the only treatments left after the antibiotics options are life saving but more harmful to the patient's body.

Lastly, transfer is possible. Some bugs can transfer their ability to resist the antibiotic to other bacteria or fungi. Patients can also transfer the resistant bug to other patients, staff, or family members.

March and April DOUBLE ISSUE!

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Bugs of Concern These bacteria and fungus are some germs from the Urgent and Serious hazard levels detailed in the CDC's Antibiotic Resistance Threat report.

Clostridioides difficile (C. diff)

Carbapenem-resistant Enterobacteriaceae (Includes E. coli, Klebsiella, Salmonella, Shigella and many others.)

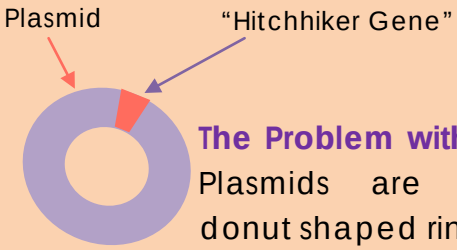
Drug-resistant Neisseria gonorrhoeae

Multidrug-resistant Acinetobacter (MDRA)

Multidrug-resistant Pseudomonas aeruginosa

Fluconazole-resistant Candida

Extended spectrum β-lactamase producing Enterobacteriaceae (ESBLs)



The Problem with Plasmids Plasmids are circle or donut shaped rings of DNA which are inside bacteria. They are not a part of the DNA building blocks which make up the cell and can travel from one bug to another. When they travel, they can take blueprints (genes) for resistance with them and help turn a bug previously killed by antibiotics into a resistant one. These genes can be called "hitchhiker genes."

Mcr-1? In 2015 China released a report about detection of a gene for resistance to colistin. **Colistin is a last-defense antibiotic,** used against bacteria resistant to multiple drugs. **In 2016** the gene was discovered in the urine of a U.S. patient with no recent international travel. The gene was being carried by the **E. coli** bacteria. Originally this gene was discovered on a plasmid and could likely be transferred to other similar bacteria, spreading colistin-resistance. Since the initial report, Mcr-1 has been identified in Shigella, Salmonella, and Klebsiella positive samples, from food, the environment, animals and humans.

Bad Blueprints (Genes) These genes make enzymes which *hydrolyze* (use microscopic water to break down) the structure of the antibiotic. This makes the antibiotic not work so it cannot kill the bacteria. Here are 5 genes tested for in Texas that commonly work against beta-lactam type antibiotics*:

- **VIM (*Verona integron-encoded metallo-β-lactamase*)**
  - International travel is seen as a main exposure; often found in Pseudomonas aeruginosa.
- **IMP (*Active on Imipenem*)**
  - Usually Pseudomonas aeruginosa, Serratia marcescens, and other Enterobacteriaceae.
- **KPC (*Klebsiella pneumoniae* carbapenemase).**
  - Plasmid transferrable; usually found on K. pneumoniae but also others; Resistant to a wide variety of antibiotics.
- **NDM (*New Delhi metallo-β-lactamase*)**
  - Klebsiella pneumoniae, E. coli, and other Enterobacteriaceae.
- **OXA48 (Oxacillin-hydrolyzing-*β-lactamase 48*)**
  - Acinetobacter and Enterobacteriaceae; numerous enzymes in this group. Many work on carbapenems.

*(cephalosporins and cephems, carbapenems, monobactams, penicillins, clavams, carbacephems.)

C. Auris: The Fungal Factor

Candida is a fungus (yeast) which generally lives in your gut or on your skin. It can cause infections in the mouth, throat, vagina or *invasive* infections in the blood or other organs.

***Candida auris (C. auris)* is a related fungus that is of growing concern. It is often drug resistant and has been reported to cause outbreaks in healthcare facilities. Usually it is hard to identify using the typical lab tests, and easy to confuse with other yeasts, which may lead to improper treatment.**

What can I do to stop the spread of antibiotic resistance and multidrug-resistant organisms (MDROS)?

Here are some tips for Healthcare Providers, Laboratorians, and Patients CDC.gov/drugresistance

Healthcare Facilities

- Help prevent infections and their spread
- Practice good hand hygiene
- Keep ill patients under contact precautions
- Alert the receiving facility when transferring an MDRO+ patient using an infection control transfer form
- Ask patients about recent healthcare facility visits and international travel
- Prescribe antibiotics responsibly, and only for bacteria
- Work closely with the lab to monitor for resistant infections

Laboratories

Participate in the (Antibiotic Resistance Laboratory Network) **ARLN**

Laboratories across Texas submit resistant specimens to the Texas Department of State Health Services Laboratory (DSHS) for surveillance.

This helps state and local health departments more rapidly detect outbreaks of resistant organisms.

It also helps the CDC become aware of novel resistant mechanisms.

To sign up contact DSHS at **TexasARLN@dshs.texas.gov** or contact your local health department.

Patients

- Get Vaccinated
- Practice good handwashing
- Talk to your doctor about your risk of infection, especially if you have a weak immune system.
- Ask questions and raise concerns about infections or provider hygiene.
- Practice food safety when cooking or storing foods
- Use condoms to protect against sexually transmitted infections

References and Additional Information

- CDC - Antibiotic/Antimicrobial Resistance
- CDC's 2013 Antibiotic Resistance Threats in the United States Report (PDF)
- The Role of Epidemic Resistance Plasmids and International High-Risk Clones in the Spread of Multidrug-Resistant *Enterobacteriaceae*
  Amy J. Mathers, Gisele Peirano, Johann D. D. Pitout
  Clinical Microbiology Reviews Apr 2015, 28 (3) 565-591; **DOI:** 10.1128/CMR.00116-14
- Carbapenemases: the Versatile ß-Lactamases
  Anne Marie Queenan, Karen Bush
  Clinical Microbiology Reviews Jul 2007, 20 (3) 440-458; **DOI:** 10.1128/CMR.00001-07
- Science Direct - Hydrolysis
- CDC Health Alert Network - Mcr-1 Gene in E. coli
- CDC - Types of Fungal Diseases
- CDC - AR Lab Network
- Merck Manuals - Beta-lactam Antibiotics
- Photo: Multidrug-resistant *Klebsiella pneumoniae* bacteria. Provided by the National Institute of Allergy and Infectious Diseases (NIAID)
- Photo: *Candida albicans* ultrastructural morphology. Provided by CDC/Dr. Gordon Roberstad.

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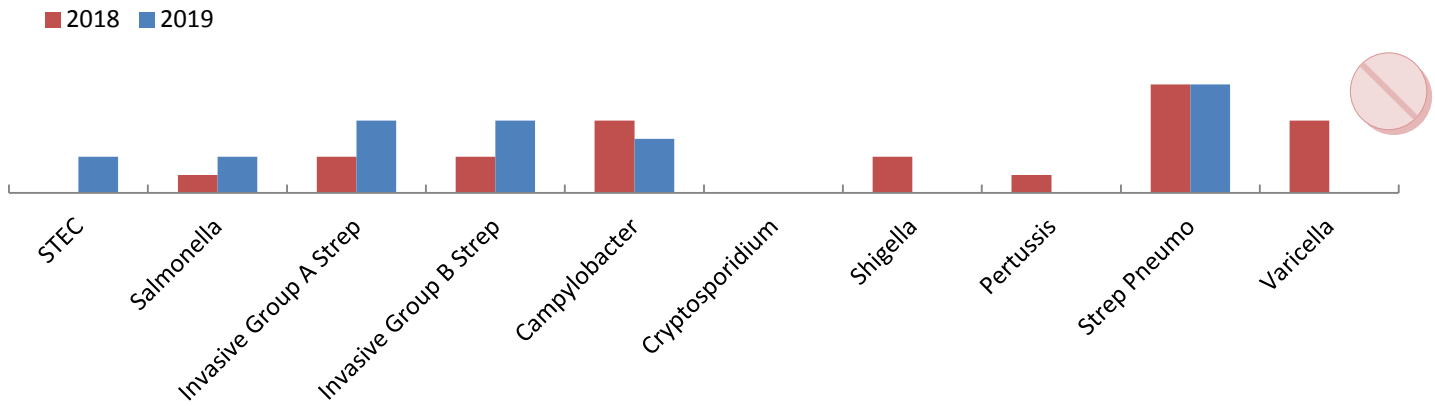
2018 and 2019 February Case Count Comparison of Selected Illness*
In Potter and Randall Counties

*All data are provisional. All data points without labels are <10 cases.



2018 and 2019 March Case Count Comparison of Selected Illness*
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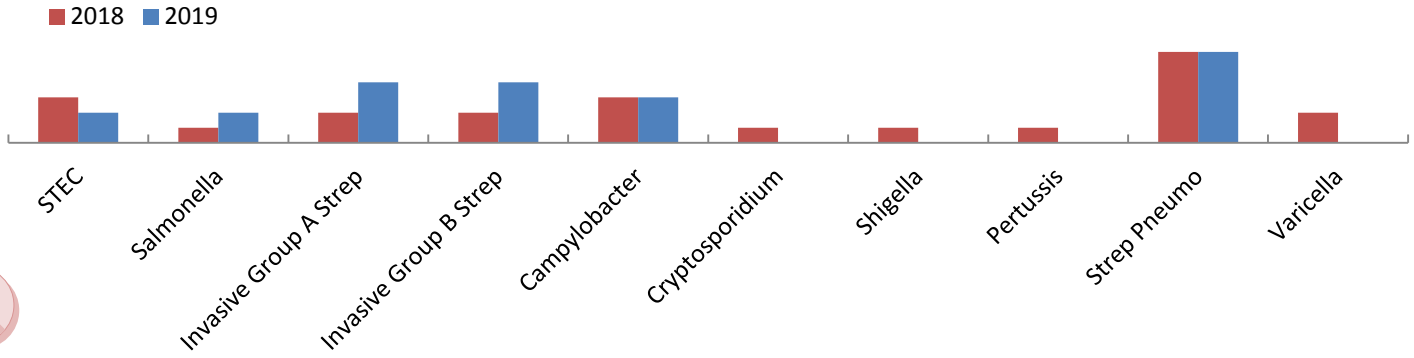

2018 and 2019 January – March Case Count Comparison of Selected Illness*
In Potter and Randall Counties

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