

ANIMAL AND HUMAN HEALTH PREVENTION OPPORTUNITIES

Antibiotic Resistance

In the prior edition of *Montana One Health*, we discussed the mechanisms of antibiotic resistance. In this edition, we will discuss what organisms are of concern, how antibiotic resistance is tracked, and steps federal organizations are taking to combat resistance in human and veterinary medicine.

Top Threats

In 2013, the Centers for Disease Control and Prevention published a report outlining the top 18 antibiotic-resistance threats in the United States. Each organism was categorized as urgent, serious, or concerning based on clinical impact, economic impact, incidence, 10-year projection of incidence, transmissibility, availability of effective antibiotics, and barriers to prevention.

Urgent Threats

- *Clostridium difficile*
- Carbapenem-resistant Enterobacteriaceae (CRE)
- *Neisseria gonorrhoeae*

Serious Threats

- Multidrug-resistant *Acinetobacter*
- Drug-resistant *Campylobacter*
- Fluconazole-resistant *Candidia*
- Extended spectrum B-lactamase producing Enterobacteriaceae
- Vancomycin-resistant *Enterococcus* (VRE)
- Drug-resistant *Pseudomonas aeruginosa*
- Drug-resistant Non-typhoidal *Salmonella*
- Drug-resistant *Salmonella* Typhi
- Drug-resistant *Shigella*
- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Drug-resistant *Streptococcus pneumoniae*
- Drug-resistant tuberculosis

Concerning Threats

- Vancomycin-resistant *Staphylococcus aureus* (VRSA)
- Erythromycin-resistant Group A *Streptococcus*
- Clindamycin-resistant Group B *Streptococcus*

Federal Response

About one in five resistant infections are caused by organisms from food and animals. Because antibiotic resistance affects both human and animal health, collaboration is needed across sectors. In 2014 multiple federal agencies worked collaboratively to develop a National Strategy for Combating Antibiotic-Resistant Bacteria. The plan outlines four key areas: (1) slow the development of resistant bacteria and prevent the spread of resistant infections, (2) strengthen national one-health surveillance efforts to combat resistance, (3) advance development and use of rapid and innovative diagnostic tests for identification and characterization of

resistant bacteria, and (4) improve international collaboration; capabilities for antibiotic resistance prevention, surveillance, and control; and antibiotic research and development.

Antibiotic Resistance Surveillance

Antibiotic resistance is tracked through many different surveillance systems. The National Antimicrobial Resistance Monitoring System (NARMS) is a collaboration between CDC, FDA, United States Department of Agriculture (USDA), and state and local health departments that track changes in antibiotic susceptibility of foodborne and other enteric bacteria. The system collects information on antibiotics important to both human and veterinary medicine. CDC tests isolates from humans and FDA and USDA test isolates from retail meats and food animals.

The Emerging Infections Program (EIP) has three components: (1) Active Bacterial Core surveillance (ABCs) which provides clinical information and resistance data for bacteria primarily causing infections in the community; (2) Healthcare-Associated Infections-Community Interface (HAIC) which monitors resistance data for bacteria and fungi that cause infections at the intersection of healthcare and the general community; and (3) Foodborne Diseases and Active Surveillance Network (FoodNet) which provides the clinical data and epidemiologic data for the human isolates in NARMS.

Other surveillance systems include the National Healthcare Safety Network (NHSN) which provides information on infections and drug-resistance within healthcare settings; the Gonococcal Isolate Surveillance Program (GISP) which tracks antibiotic resistance for gonococcal isolates, and the National Tuberculosis Surveillance System which tracks antibiotic resistance in tuberculosis cases.

Human Health

In addition to surveillance activities, the CDC works with the healthcare system to improve prescribing practices in both outpatient and inpatient settings and provides national infection prevention guidelines and tools to prevent infections in healthcare settings. Education of healthcare providers focuses on ensuring antibiotics are used only when necessary and when antibiotics are needed, the appropriate one is used. CDC is the nation's reference laboratory providing laboratory capacity to identify and track antibiotic resistance. In addition, CDC works with FDA, USDA, and local and state health departments to track and prevent antibiotic-resistance in food.

Animal Health

FDA is the primary regulatory agency for antibiotic use in animals and is undertaking many activities to address antibiotic resistance in animals including (1) human food safety assessment of new antimicrobials, (2) providing guidance on judicious use, (3) an updated veterinary feed directive, (4) enhanced surveillance activities with NARMS, (5) educational activities and outreach, (6) expanded research activities, and (7) limiting the use of certain cephalosporins and withdrawal of the approval to use fluoroquinolones in poultry. FDA's judicious use policy limits medically important antimicrobials to uses in food-producing animals considered necessary for assuring animal health and limits medically important antimicrobials to uses in food-producing animals to those that include veterinary oversight or consultation.

USDA has no regulatory authority for antibiotic use in animals, but does complete some residue testing at slaughter. However, USDA agencies conduct research on antibacterial resistance, conduct monitoring and surveillance to characterize health and management of livestock and poultry populations, provide laboratory testing at the National Veterinary Services Laboratories, and provide education.

The efforts to track and address antibiotic resistance are occurring in a collaborative effort between human and animal health. In the next edition of Montana *One Health*, we will discuss what steps individual practitioners can do to minimize antibiotic resistance.

Antibiotic Resistance Federal Activities - Key Points

- Many of the antibiotic resistant threats have both animal and human impacts.
- Surveillance of antibiotic resistance helps identify and track changes in resistance patterns and requires collaboration between human and animal health sectors
- Federal agencies provide oversight and guidance on use of proper and judicious use of antibiotics and conduct research on antibiotic resistance.

References available on web version. [Visit http://www.dphhs.mt.gov/publichealth/publications.shtml](http://www.dphhs.mt.gov/publichealth/publications.shtml).

2,836 copies of this public document were published at an estimated cost of \$0.59 per copy, for a total cost of \$1660.54, which includes \$711.04 for printing and \$949.50 for distribution.

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