Antibiotic Resistance

Bacterial resistance to antibiotics is a serious global health threat. In the United States, antibiotic-resistant bacteria cause an estimated 2 million infections and 23,000 deaths yearly. Procedures like joint replacements, appendectomies, Caesarian sections, organ transplants and cancer chemotherapy are among medical interventions that depend on effective antibiotics. Comprehensive, collaborative action is needed to mitigate potential future harm due to increased antibiotic resistance.

Development of Resistance

Antibiotic resistance among bacteria occurs naturally in the environment, but the major contributor to the increase in resistance over the past half century is selective pressure from antibiotic use. A second major factor is transmission of resistant organisms in healthcare settings, in the community, via travel or medical tourism, between animals and humans, and from contaminated food products or environmental sources.

If selective pressure from exposure to antibiotics makes bacteria resistant, it makes sense to examine where antibiotics are used. Human medical and dental care account for about a fifth of antibiotics sold in the United States. Of note, about a tenth of human antibiotic use is in dental care. Most use of antibiotics in humans is therapeutic; situations for prophylactic use include pertussis exposure or endocarditis prevention.

Centers for Disease Control and Prevention (CDC) estimate that 30-50% of antibiotic use in humans is unnecessary or inappropriate. Of the more than 100 million outpatient antibiotic prescriptions written per year, about 40% are for upper respiratory infections, the vast majority of which are caused by viral pathogens that do not respond to antibiotics. A first step is educating the public that antibiotics are not always the answer for every cold or cough. Sometimes just extra rest, hot soup and the tincture of time are the right prescriptions.

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A second step is to work with healthcare providers. All healthcare facilities should have an antibiotic stewardship program to educate prescribers, monitor prescribing practices, and implement measures to improve antibiotic use. Center for Medicare and Medicaid Services (CMS) is considering requiring hospitals to have stewardship programs to receive Medicare reimbursement, a strong incentive for hospitals to act. Long term care facilities are high users of antibiotics and should also be a focus for such efforts.

According to FDA data, about 80% of antibiotics sold in this country are for use in animals. Information is incomplete, but it is known that in addition to therapeutic uses, a large proportion of antibiotics are used for prevention. For example, if a few animals have evidence of an infection, the entire herd or flock may be given preventive antibiotics to keep the infection from spreading. In the 1950s it was noted that antibiotics improved animal’s growth and feed efficiency. Giving animals low-dose antibiotics provides economic advantages, allowing farmers to reduce the amount of food and time for animals to reach the desired size. Antibiotic use has become widespread in animal agriculture and is not always under veterinarian supervision.

The FDA developed new guidance and rules that promote judicious use of antibiotics in animal agriculture. Specific recommendations are to use antibiotics in animals only when necessary for assuring animal health and eliminating antibiotic use for growth or production purposes only. Veterinary oversight is recommended for all other uses, including preventive purposes. These voluntary guidances give time for necessary changes before mandatory rules are instituted. It will be interesting to see the impact of California’s recently passed Senate Bill 27 that makes the FDA guidance mandatory.

Response in Washington

The Washington State Department of Health (DOH) addresses bacterial resistance through a number of strategies that are aligned with President Obama’s National Action Plan to Combat Antibiotic Resistance (see Resources). The strategies for intervention include:
Detect: Surveillance and laboratory capacity to identify high profile resistant organisms

Protect: Notification to providers and infection preventionists so appropriate treatment and infection control interventions can be implemented, also communication to receiving healthcare facilities about patients who are infected or colonized with epidemiologically important organisms

Prevent: Antimicrobial stewardship and immunization to avoid selective pressure that induces resistance and prevent infections

Innovate: Developing new diagnostics and therapeutics; of note, the Washington State Public Health Laboratories are among six in the country that perform PCR for presence of carbapenemases conferring bacterial resistance

Collaborate: Take a “One Health” approach for public health and health professional organizations, across borders, and among human, animal and environmental health experts

Washington developed a unique infrastructure to improve communication, coordination, and collaboration to address bacterial resistance. The statewide One Health Steering Committee has representation from the Washington State departments of Agriculture, Fish and Wildlife, and Health; University of Washington Center for One Health Research, Division of Allergy and Infectious Disease; Washington State University, College of Global Animal Health; Office of the Governor; and Washington State Veterinary Medical Association. The steering committee oversees the One Health Antimicrobial Stewardship workgroup dedicated to improving antibiotic use in all sectors, and the One Health Surveillance and Data Integration workgroup that seeks to expand, integrate, and analyze resistance data from multiple species and environments. The Antimicrobial Stewardship Advisory Committee focuses on human health and advises the DOH Healthcare Associated Infections (HAI) Program on planned activities.

Recent HAI Program activities include partnering with hospital and pharmacy associations on promoting and strengthening hospital antibiotic stewardship programs; publicly saluting facilities with strong stewardship programs; promoting the Choosing Wisely initiative that seeks to use medical resources to improve patient outcomes, promote population health, and save money; developing state-endorsed practice guidelines for clinical syndromes often inappropriately treated with antibiotic; and spreading the important message that we all – patients, consumers, prescribers and food producers – have a part to play in combating antibiotic resistance.

**Resources**

National Action Plan: [https://www.whitehouse.gov/sites/default/files/docs/national_action_plan_for_combating_antibiotic-resistant_bacteria.pdf](https://www.whitehouse.gov/sites/default/files/docs/national_action_plan_for_combating_antibiotic-resistant_bacteria.pdf)

CDC resources: [http://www.cdc.gov/getsmart/week/index.html](http://www.cdc.gov/getsmart/week/index.html)


DOH One Health: [http://www.doh.wa.gov/ForPublicHealthandHealthcareProviders/PublicHealthSystemResourcesandServices/OneHealth](http://www.doh.wa.gov/ForPublicHealthandHealthcareProviders/PublicHealthSystemResourcesandServices/OneHealth)