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Antibiotic Resistance is an Emerging Threat and We All Can Help to Fix It

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Antibiotics are powerful tools in the treatment of infections. However, after only 70 years of use their effectiveness is beginning to wane. Antibiotic resistance has been identified as a major public health threat by many organizations including the Centers for Disease Control and Prevention (CDC) and the World Health Organization. Successful efforts to slow resistance involve antimicrobial stewardship. Stewardship can be defined as the careful and responsible management of a limited resource. Experts agree that it will take a multidisciplinary, global effort to address this problem successfully.

How big of a problem is antibiotic resistance? The CDC estimates that 2,000,000 people a year are diagnosed with an infection that has some level of resistance, and that 23,000 of those people will die as a result. Also concerning, are the development and spread of highly resistant bacteria sometimes called “superbugs”. “Superbugs” can be so resistant to antibiotics that there may be no treatments available. Not surprisingly, this results in a higher mortality rate. *Clostridium difficile* infections are highly associated with antibiotic use but are not necessarily drug resistant infections. *C. difficile* infections routinely complicate a patient’s recovery and extend hospitalizations and are thought to result in 14,000 deaths a year.

So what’s the solution? Unfortunately, this is not an easy question to answer. Antibiotics are used for a variety of infections. Further, antibiotic resistant pathogens can be found not just in people, but in our pets, livestock, food, and the environment. There needs to be a balance in the use of these powerful infection fighting tools to avoid overuse and preserve the efficacy of antibiotics. The CDC outlined four key actions to address antibiotic resistance in their new report entitled “Antibiotic Resistance Threats in the United States, 2013” (<http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf>): prevent infections, track resistant bacteria, engage in antimicrobial stewardship to promote the best use of available antibiotics, and promote the development of new antibiotics and diagnostic tests for resistant bacteria. Each of these four strategies are vitally important to addressing this problem but antimicrobial stewardship is the one action where regardless of your role in healthcare, including patients, everyone can make an impact on reducing antimicrobial resistance.

One of the key concepts for antimicrobial stewardship is that antibiotics and similar drugs are a shared resource. The way antibiotics are used in one patient can have a direct influence on the effectiveness of

that antibiotic in another patient. Antimicrobial stewardship focuses on appropriate prescribing practices by emphasizing that the right antibiotic be prescribed for the right diagnosis, the right amount of time, and at the right dosage. While facilities vary and so will their stewardship programs, CDC has outlined minimum standards for antibiotic stewardship programs:

1. Establish and maintain leadership commitment: Dedicate necessary human, financial, and IT resources.
2. Remain accountable: Appoint a single leader responsible for program outcomes. Physicians have proven successful in this role.
3. Provide drug expertise: Appoint a single pharmacist leader to support improved prescribing.
4. Take action: Implement at least one prescribing improvement action, such as requiring reassessment within 48 hours to check drug choice, dose, and duration.
5. Monitor prescribing and antibiotic resistance patterns.
6. Report to staff prescribing and resistance patterns, and implement steps to improve.
7. Offer education about antibiotic resistance and improving prescribing practices.

An effective antimicrobial stewardship program can benefit healthcare facilities in a number of ways. Some benefits include enhancing collaborations between the pharmacy, infection control, and laboratory departments, reducing infections associated with previous antibiotic use such as *C. difficile* infections, reducing costs, and reducing adverse drug events. Research has shown that by utilizing best practices for prescribing we can reduce the number of resistant infections. Antimicrobial stewardship programs cultivate team-based problem solving to address a major public health threat and can be a model for addressing other such issues as they arise.

The Arkansas Department of Health (ADH) has a healthcare-associated infections (HAI) program that monitors antibiotic resistance associated with device usage, surgical site infections, methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections, and *C. difficile* infections. Additionally, the HAI advisory committee has made antimicrobial stewardship a priority and is partnering with other stakeholders to increase awareness. For example, the ADH partnered with the Arkansas Chapter of the American College of Clinical Pharmacy to host an antimicrobial stewardship summit in the fall of last year. This event was well attended from healthcare professionals from around the state eager to get more information on implementing successful antimicrobial stewardship in their own facility.

The focus of antimicrobial stewardship efforts currently is based on inpatient hospital programs but to fully address resistance, efforts will need to be made in outpatient health settings and in educating the public. Patients should be informed on the differences between bacterial and viral infections, that antibiotics are not an effective treatment for viral infections, the growing problem of antimicrobial resistance, the importance of taking the full course of antibiotic treatment, and that hand washing is the most important action to prevent infections. CDC's Get Smart campaign (www.cdc.gov/getsmart) has a

wealth of information, resources, toolkits, continuing education, and deliverables for interested persons in a variety of healthcare settings.

To summarize, antimicrobial stewardship entails formalized strategies to ensure that antibiotics are used effectively. Inaction on this topic could have serious implications in that once easily treated conditions could become untreatable. Combating antimicrobial resistance is a winnable battle but it will take a unified effort from all of us to protect this endangered resource for future generations of patients.

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