



# The Challenge



## ***Antibiotics—Pillars of Public Health***

Ever since antibiotics were first used in the 1940s, these life-saving drugs have transformed human medicine in the United States and around the world.<sup>1</sup> Antibiotics kill the bacteria that threaten people and are used to fight bacterial infections, from pneumonia to strep to staph infections. The widespread use of antibiotics in the 20th century helped reduce death rates, manage common illnesses and extend human life expectancy.

## ***The Emergence of Antibiotic-Resistant Bacteria***

Whenever antibiotics are used, some bacteria may adapt and become resistant to these commonly used drugs. Patients infected with antibiotic-resistant bacteria may not respond to treatment with these medicines. Today, the world's leading public health and medical organizations are concerned that overuse and misuse of antibiotics are causing bacteria to develop resistance more quickly. That is why the Centers for Disease Control and Prevention (CDC) has identified antibiotic resistance as one of its top concerns.<sup>2</sup>

## ***Impacts on Public Health***

The public health implications of antibiotic-resistant bacteria go far beyond the immediate threat of an individual infection. When infections linger, the risk of developing more severe illnesses, or transmitting the infection to others, is greatly increased. According to the CDC, “antibiotic-resistant bacteria can quickly spread to family members, schoolmates, and co-workers—threatening the community with a new strain of infectious disease that is more difficult to cure and more expensive to treat.”<sup>3</sup> The human health impacts of this challenge are numerous:

- Some of the major causes of bacterial infections in the U.S., including *E. coli*,<sup>4</sup> *Salmonella*,<sup>5</sup> *Campylobacter*,<sup>6</sup> *Enterococcus*,<sup>7</sup> *Streptococcus*<sup>8</sup> and *Staphylococcus*,<sup>9</sup> are increasingly resistant to common antibiotic treatments.
- According to the Interagency Task Force on Antimicrobial Resistance, co-chaired by the CDC, the U.S. Food and Drug Administration (FDA) and the National Institutes of Health, antibiotic-resistant bacteria could make previously treatable diseases like pneumonia, meningitis and tuberculosis again untreatable.<sup>10</sup>
- Without effective antibiotics, modern medical treatments, such as operations and transplants, will become all but impossible.<sup>11</sup>

- Resistant bacterial infections are harder to treat, require multiple applications of drugs and raise the risk of complications and death. According to a team of researchers affiliated with the CDC, in 2002 alone, 99,000 people died in the U.S. of a hospital-acquired infectious disease.<sup>12</sup>
- Children, the elderly, cancer patients and the chronically ill face the greatest risk of serious infections if they should acquire an antibiotic-resistant bacterial infection.<sup>13</sup>
- More severe illnesses result in both more frequent and longer hospital stays, raising the cost of health care. In 1998, the Institute of Medicine estimated that antibiotic resistance generated at least \$4 billion to \$5 billion per year in extra costs to the U.S. health care system.<sup>14</sup> More recently, researchers with the Alliance for the Prudent Use of Antibiotics and Cook County Hospital in Chicago estimated that this number has grown to \$16.6 billion to \$26 billion per year.<sup>15</sup>

### ***The Causes of Antibiotic Resistance***

Improper use of antibiotics has been identified as a primary factor in the increase in antibiotic-resistant bacteria. Antibiotics are misused by consumers when prescriptions are not fully followed (thus failing to kill bacteria). In other cases, people with viral infections such as the cold and the flu incorrectly believe that an antibiotic will help. In fact, antibiotics do not work against viral infections. Antibiotics also are overused when they are routinely given to healthy food animals, as described below.



*Source: Richard Sugden*

### ***The Link to Food Animal Production***

Many of the antibiotics used in food animal production—including penicillins, tetracyclines, macrolides, sulfonamides and other antibiotic classes—are identical to, or in the same family as, drugs used in human medicine to cure serious diseases. According to the CDC, these similarities mean that bacteria resistant to antibiotics in animals also will be resistant to antibiotics used in humans.<sup>16</sup>

In human health care, antibiotic use is generally confined to treatment of illness. In contrast, antibiotics are often used in food animal production not only to treat sick animals but also as a means to offset the effects of overcrowding and poor sanitation as well as to spur animal growth. This helps explain why up to 70 percent of all antibiotics sold in the U.S. are given to healthy food animals, not people.<sup>17</sup>

In July 2010 the FDA, U.S. Department of Agriculture and the CDC testified before Congress that there was a definitive link between the routine, non-therapeutic uses of antibiotics in food animal production and the crisis of antibiotic resistance in humans.<sup>18</sup> Moreover, the American Medical Association, the American Academy of Pediatrics and other leading medical groups all warn that the routine use of antibiotics in food animal production presents a serious and growing threat to human health because it contributes to the spread of dangerous antibiotic-resistant bacteria.

## ***The Solution***

Working together, citizens and government, the agricultural industry and public interest organizations have the tools to reduce overuse and misuse of antibiotics:

- Individuals can practice safe and effective use of antibiotics by only taking the drugs when and as prescribed by a doctor.
- The food animal industry can adopt cost-effective alternative hygienic strategies for preventing illness in animals and discontinue the use of antibiotics in feed for growth promotion and feed efficiency.<sup>19</sup>

**Up to 70 percent of all antibiotics sold in the U.S. are used on industrial farms in healthy food animals. This makes the U.S. one of the biggest users of antibiotics in food animal production in the world.**

Policymakers must do their part as well. Legislation introduced in the U.S. House of Representatives would help address this issue. The Preservation of Antibiotics for Medical Treatment Act would withdraw the routine, non-therapeutic use of seven classes of antibiotics vitally important to human health from food animal production unless animals or herds are sick with diagnosed. Federal legislation such as this and/or regulation is needed in order to preserve the effectiveness of these life-saving drugs and to protect human health.

## ***Our Campaign***

The Pew Campaign on Human Health and Industrial Farming is working to save antibiotics by phasing out the routine use of the drugs in food animal production. We work with public health leaders, veterinarians, agricultural interests, academics and citizens' groups who share our objective of preserving the integrity of antibiotics as a means of protecting human and animal health.

<sup>1</sup> Centers for Disease Control and Prevention, *Antibiotic Resistance Questions and Answers*, [www.cdc.gov/getsmart/antibiotic-use/antibiotic-resistance-faqs.html](http://www.cdc.gov/getsmart/antibiotic-use/antibiotic-resistance-faqs.html) (accessed July 22, 2010).

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> Infectious Diseases Society of America, *Bad Bugs, No Drugs: As Antibiotic Discovery Stagnates ... A Public Health Crisis Brews* (Alexandria, VA: Infectious Diseases Society of America, 2004). See also: James S. Lewis et al., "First Report of the Emergence of CTX-M-Type Extended-Spectrum-Lactamases (ESBLs) as the Predominant ESBL Isolated in a U.S. Health Care System," *Antimicrobial Agents and Chemotherapy* 51, no. 110 (2007).

<sup>5</sup> Margaret Mellon, C. Benbrook, and K. L. Benbrook, *Hogging It! Estimates of Antimicrobial Abuse in Livestock* (Cambridge, MA: Union of Concerned Scientists, 2001).

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

<sup>8</sup> Infectious Diseases Society of America, *Bad Bugs, No Drugs*. See also: Werner C. Albrich, D. L. Monnet, and S. Harbarth, "Antibiotic Selection Pressure and Resistance in *Streptococcus pneumoniae* and *Streptococcus pyogenes*," *Emerging Infectious Diseases* 10, no. 3 (2004): 514–517.

<sup>9</sup> Ibid. See also: R. Monina Klevens et al., "Invasive methicillin-resistant *Staphylococcus aureus* infections in the United States," *Journal of the American Medical Association* 298, no. 15 (2007): 1763–1771.

<sup>10</sup> Centers for Disease Control and Prevention, *Interagency Task Force on Antimicrobial Resistance, A Public Health Action Plan to Combat Antimicrobial Resistance* (Atlanta: Centers for Disease Control and Prevention, 2008), [www.cdc.gov/drugresistance/actionplan/](http://www.cdc.gov/drugresistance/actionplan/) (accessed July 15, 2010).

<sup>11</sup> European Center for Disease Prevention and Control, *Experts Urge Prudent Antibiotic Use to Combat Resistance* (Stockholm: European Center for Disease Prevention and Control, 2009), [www.ecdc.europa.eu/en/press/news/Lists/News/ECDC\\_DisForm.aspx?List=32e43ee8-e230-4424-a783-85742124029a&ID=325&MasterPage=1](http://www.ecdc.europa.eu/en/press/news/Lists/News/ECDC_DisForm.aspx?List=32e43ee8-e230-4424-a783-85742124029a&ID=325&MasterPage=1) (accessed July 15, 2010).

<sup>12</sup> R. M. Klevens et al., "Estimating Health Care-Associated Infections and Deaths in U.S. Hospitals, 2002," *Public Health Reports* 2007;122:160–166.

<sup>13</sup> Katherine Shea, K. Florini, and T. Barlam, "When Wonder Drugs Don't Work: How Antibiotic Resistance Threatens Children, Seniors, and the Medically Vulnerable" (Washington, DC: Environmental Defense Fund, 2001).

<sup>14</sup> Polly Harrison and J. Lederberg, "Antimicrobial Resistance: Issues and Options," Workshop Report, Forum on Emerging Infections, Division of Health and Sciences Policy, Institute of Medicine (Washington, DC: National Academy Press, 1998).

<sup>15</sup> James Gallagher, "Study: Antibiotics Problems Cost U.S. between \$17B and \$26B a Year," *Triangle Business Journal*, October 19, 2009, <http://triangle.bizjournals.com/triangle/stories/2009/10/19/daily4.html> (accessed July 15, 2010). Based on: Rebecca R. Roberts et al., "Hospital and Societal Costs of Antimicrobial-Resistant Infections in a Chicago Teaching Hospital: Implications for Antibiotic Stewardship," *Clinical Infectious Diseases* 49 (2009): 1175–1184.

<sup>16</sup> Centers for Disease Control and Prevention, National Antimicrobial Resistance Monitoring System, *Frequently Asked Questions (FAQ) about Antibiotic Resistance—Which Antibiotics Used in Food-Producing Animals Are Related to Antibiotics Used in Humans?* (Atlanta: Centers for Disease Control and Prevention, 2005), [http://www.cdc.gov/narms/faq\\_pages/11.htm](http://www.cdc.gov/narms/faq_pages/11.htm) (accessed July 15, 2010).

<sup>17</sup> Margaret Mellon, C. Benbrook, and K. L. Benbrook, *Hogging It! Estimates of Antimicrobial Abuse in Livestock*.

<sup>18</sup> Hearing: Antibiotic Resistance and the Use of Antibiotics in Animal Agriculture, Subcommittee on Health, Energy and Commerce Committee, U.S. House of Representatives, July 12, 2010, <http://energycommerce.house.gov/hearings/hearingdetail.aspx?NewsID=8001> (accessed January 24, 2011).

<sup>19</sup> James M. MacDonald and W. D. McBride, "The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks," *Economic Information Bulletin*, no. 43 (2009). Economic Research Service, U.S. Department of Agriculture.