Antibiotic Resistance and its Impact on Cancer Patients

For more than half a century, antibiotic drugs have ensured that potentially life-threatening bacterial infections are treatable. Today, however, more and more bacterial infections fail to respond to antibiotic treatment. A federal task force recently warned that antibiotic resistance is "a growing menace to all people" and concluded that if nothing is done, treatments for common infections will become "increasingly limited and expensive-*and, in some cases, nonexistent*."

Antibiotic resistance poses a threat to everyone, but cancer patients are at particular risk. Cancer is typically treated with surgery, radiation, chemotherapy, and / or transplantation of bone marrow or blood stem cells. Each of these treatment techniques leaves a patient more vulnerable to infection than is a healthy adult of similar age.

A large majority of cancer patients undergo surgery. Infections at the site of surgery account for approximately 40% of all infections in surgical patients. Many of these surgery-related infections are bacterial, and growing numbers of them are resistant to multiple antibiotics.

Another cancer treatment is radiation, which is often used in combination with other types of therapy. Unfortunately, radiation is not selective and destroys all cells in its pathway, including those necessary to ward off disease. A patient who undergoes radiation treatment for head and neck cancer, for example, may end up with ulcers in the mouth, which breaks down the mouth's protective barrier and leaves it vulnerable to invasion by harmful bacteria.

Chemotherapy, or the administration of drugs to kill cancer cells, is a treatment mainstay for cancer that has metastasized, or spread, beyond the originating site. Chemotherapy also can help reduce pain associated with incurable cancers. As with radiation, all but the newest chemotherapy drugs are nonspecific in their target and destroy many other cells that are necessary to the immune system. There are two very common consequences of chemotherapy. One is the destruction of white blood cells that are required to fight off bacterial infection. The other is severe damage and inflammation of the lining of the mouth, gastrointestinal and respiratory tracts - leaving an easy gateway for disease-causing bacteria to enter the body.

Finally, transplantation of bone marrow or blood stem cells has become a standard therapy for patients who require high doses of chemotherapy. The procedure requires removal and storage of the patient's marrow or stem cells before chemotherapy is initiated, because chemotherapy causes prolonged suppression of the bone marrow's ability to form new disease-fighting cells. Once chemotherapy is concluded, the patient's marrow or stem cells can then be returned to the patient. But while intensive chemotherapy is underway and before the marrow has resumed normal function, infection is a major cause of mortality. During the first month or two after the transplant, effective antibiotics are a mainstay of treatment and necessary for the patient's survival.

Antibiotics have revolutionized cancer treatment by enabling the use of more aggressive therapies. This has led to dramatically higher survival rates. One of every two men and one of three women in the United States is expected to develop cancer during their lifetimes, and many of them will be treated with one or more of the therapies described above. For this medically vulnerable group-and for society as a whole-the loss of effective antibiotics would have immense ramifications.

Although careful use of antibiotics can result in the emergence of antibiotic-resistant bacteria, inappropriate use greatly accelerates this process. The more often bacteria are exposed to antibiotics, the more resistant they become. Because bacteria reproduce rapidly, these antibiotic-resistant bacteria can spread efficiently. Unlike higher organisms, bacteria can transfer DNA to other bacteria that are not their offspring, and even to members of completely unrelated bacterial species. In effect, bacteria can teach one another how to outwit antibiotics.

Antibiotic resistance carries a significant economic toll as well as a medical one. The congressional Office of Technology Assessment calculated that resistance by just six types of bacteria increased hospital treatment costs by $1.3 billion as of 1995. Few new drugs are now in the pipeline, and any new antibiotics will be considerably more expensive than existing ones; research and development costs for a new drug may top $800 million, by some estimates, while prescription costs likely will far exceed those for older medicines.

Although the misuse of antibiotics in human medicine has been well publicized, less attention has been paid to the serious overuse of antibiotics in agriculture. By one estimate, 80 percent of all antibiotics and related drugs (antimicrobials) sold in the United States are used in livestock production. The lion's share-roughly 70 percent of the total-are fed to healthy farm animals to promote growth and prevent diseases that would otherwise result from the unsanitary conditions found in overcrowded agricultural facilities. About half of those drugs are identical or closely related to medicines used in treating humans.

Because of the growing health crisis of antibiotic resistance, which could render these "wonder drugs" useless in treating infections, the American Medical Association now opposes the routine feeding of antibiotics to healthy farm animals. The American College of Preventive Medicine, the American Public Health Association, and the World Health

Organization have taken similar positions. A National Academy of Sciences report estimates that eliminating all such uses in poultry, cow, and swine production would cost U.S. consumers only about $5 to $10 per person annually.

The Centers for Disease Control and Prevention has observed that "decreasing inappropriate antibiotic use is the best way to control resistance." Key steps in doing so include adoption of policies aimed at ending the inappropriate use of antibiotics in agriculture, as well as continued implementation of programs to educate patients, parents and physicians about the need to use antibiotics more sparingly.

In particular:

- Congress should phase out the routine feeding of medically important antibiotics to healthy livestock and poultry and other inappropriate uses of vital antibiotics in agriculture. S. 2508, introduced by Sen. Edward M. Kennedy, and H.R. 3804, introduced by Rep. Sherrod Brown, would accomplish these objectives.

- Producers and marketers of meat and poultry should voluntarily agree to stop selling or buying meat produced with routine feeding of antibiotics to healthy animals, and pharmaceutical companies should stop producing antibiotics for such use in animals.

- Finally, those who decide which meat products to purchase - whether an individual shopper buying a few pounds of meat during a weekly trip to the grocery store, or a food-service corporation that purchases millions of pounds in a single transaction - should select meat produced without the inappropriate use of antibiotics.

Unless we act now, we face a future of untreatable bacterial infections. Cancer patients will be among the first to pay the price.

For a full report on antibiotic resistance and vulnerable groups, see www.keepantibioticsworking.com/vulnerable