

NIH News in Health

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Stop the Spread of Superbugs Help Fight Drug-Resistant Bacteria

For nearly a century, bacteria-fighting drugs known as antibiotics have helped to control and destroy many of the harmful bacteria that can make us sick. But in recent decades, antibiotics have been losing their punch against some types of bacteria. In fact, certain bacteria are now unbeatable with today's medicines. Sadly, the way we've been using antibiotics is helping to create new drug-resistant "superbugs."

Superbugs are strains of bacteria that are resistant to several types of antibiotics. Each year these drug-resistant bacteria infect more than 2 million people nationwide and kill at least 23,000, according to the U.S. Centers for Disease Control and Prevention (CDC). Drug-resistant forms of tuberculosis, gonorrhea, and staph infections are just a few of the dangers we now face.

Antibiotics are among the most commonly prescribed drugs for people. They're also given to livestock to prevent disease and promote growth. Antibiotics are effective against bacterial infections, such as strep throat and some types of pneumonia, diarrheal diseases, and ear infections. But these drugs don't work at all against viruses, such as those that cause colds or flu.

Unfortunately, many antibiotics prescribed to people and to animals are unnecessary. And the overuse and misuse of antibiotics helps to create drug-resistant bacteria.

Here's how that might happen. When used properly, antibiotics can help destroy disease-causing bacteria. But if you take an antibiotic when

you have a viral infection like the flu, the drug won't affect the viruses making you sick. Instead, it'll destroy a wide variety of bacteria in your body, including some of the "good" bacteria that help you digest food, fight infection, and stay healthy. Bacteria that are tough enough to survive the drug will have a chance to grow and quickly multiply. These drug-resistant strains may even spread to other people.

Over time, if more and more people take antibiotics when not necessary, drug-resistant bacteria can continue to thrive and spread. They may even share their drug-resistant traits with other bacteria. Drugs may become less effective or not work at all against certain disease-causing bacteria.

"Bacterial infections that were treatable for decades are no longer responding to antibiotics, even the newer ones," says Dr. Dennis Dixon, an NIH expert in bacterial and fungal diseases. Scientists have been trying to keep ahead of newly emerging drug-resistant bacteria by developing new drugs, but it's a tough task.

"We need to make the best use of the drugs we have, as there aren't many in the antibiotic development pipeline," says Dr. Jane Knisely, who oversees studies of drug-resistant bacteria at NIH. "It's important to



understand the best way to use these drugs to increase their effectiveness and decrease the chances of resistance to emerge."

You can help slow the spread of drug-resistant bacteria by taking antibiotics properly and only when needed. Don't insist on an antibiotic if your health care provider advises otherwise. For example, many parents expect doctors to prescribe antibiotics for a child's ear infection. But experts recommend delaying for a time in certain situations, as many ear infections get better without antibiotics.

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NIH researchers have been looking at whether antibiotics are effective for treating certain conditions in the first place. One recent study showed that antibiotics may be less effective than previously thought for treating a common type of sinus infection. This kind of research can help prevent the misuse and overuse of antibiotics.

"Treating infections with antibiotics is something we want to preserve for generations to come, so we shouldn't misuse them," says Dr. Julie Segre, a senior investigator at NIH.



Wise Choices Blocking Harmful Bacteria

- Wash your hands often with soap and water, or use an alcohol-based hand sanitizer.
- If you're sick, make sure your doctor has a clear understanding of your symptoms. Discuss whether an antibiotic or a different type of treatment is appropriate for your illness.
- If antibiotics are needed, take the full course exactly as directed. Don't save the medicine for a future illness, and don't share with others.
- Maintain a healthy lifestyle—including proper diet, exercise, and good hygiene—to help prevent illness, thereby helping to prevent the overuse or misuse of medications.

In the past, some of the most dangerous superbugs have been confined to health care settings. That's because people who are sick or in a weakened state are more susceptible to picking up infections. But superbug infections aren't limited to hospitals. Some strains are out in the community and anyone, even healthy people, can become infected.

One common superbug increasingly seen outside hospitals is methicillin-resistant *Staphylococcus aureus* (MRSA). These bacteria don't respond to methicillin and related antibiotics. MRSA can cause skin infections and, in more serious cases, pneumonia or bloodstream infections.

A MRSA skin infection can appear as one or more pimples or boils that are swollen, painful, or hot to the touch. The infection can spread through even a tiny cut or scrape that comes into contact with these bacteria. Many people recover from MRSA infections, but some cases can be life-threatening. The CDC estimates that more than 80,000 aggressive MRSA infections and 11,000 related deaths occur each year in the United States.

When antibiotics are needed, doctors usually prescribe a mild one before trying something more aggressive like vancomycin. Such newer antibiotics can be more toxic and more expensive than older ones.

Eventually, bacteria will develop resistance to even the new drugs. In recent years, some superbugs, such as vancomycin-resistant *Enterococci* bacteria, remain unaffected by even this antibiotic of last resort.



Web Links

For more about antibiotic resistance, click the "Links" tab at:

<http://newsinhealth.nih.gov/issue/Feb2014/Feature1>

"We rely on antibiotics to deliver modern health care," Segre says. But with the rise of drug-resistant bacteria, "we're running out of new antibiotics to treat bacterial infections," and some of the more potent ones aren't working as well.

Ideally, doctors would be able to quickly identify the right antibiotic to treat a particular infection. But labs need days or even weeks to test and identify the bacteria strain. Until the lab results come in, antibiotic treatment is often an educated guess.

"We need to know how to treat for a favorable outcome, but knowledge about the infection can be several days away," explains Dr. Vance Fowler, an infectious disease expert at Duke University School of Medicine.

Fowler says faster diagnostic testing offers one of the best hopes for treating infectious diseases. Technology is catching up, he says, and new research in this area looks promising.

Genetic studies by NIH-supported researchers such as Segre and Fowler are also helping us understand the unique characteristics of antibiotic-resistant bacteria. Their findings could point the way to innovative new treatments.

While scientists search for ways to beat back these stubborn bacteria, you can help by preventing the spread of germs so we depend less on antibiotics in the first place.

The best way to prevent bacterial infections is by washing your hands frequently with soap and water. It's also a good idea not to share personal items such as towels or

razors. And use antibiotics only as directed. We can all do our part to fight drug-resistant bacteria. ■

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Gripped by Gout

Avoiding the Ache and Agony

Sudden, painful swelling at the base of the big toe is often the first warning sign of gout. It can affect other joints as well. Without treatment, gout can lead to severe joint damage and make it hard for you to move. The good news is, most types of gout are treatable, especially if caught early.

About 4% of adults in the U.S. have been diagnosed with gout. It's a form of arthritis—in fact, the 2nd most common form after osteoarthritis. And it's a growing problem.

"The prevalence of gout more than doubled nationwide between the 1960s and 1990s, and the increases have continued into the 1990s and 2000s," says Dr. Hyon Choi, a physician who studies gout at Boston University School of Medicine.

Experts suspect that climbing rates of obesity and high blood pressure are partly to blame for the rise in gout. Gout has also been linked

to other medical conditions, such as kidney problems, diabetes, and heart disease.

Gout is caused by tiny needle-like crystals that build up in the joints, leading to sudden **inflammation** and intense pain. The crystals are made of uric acid, a substance that normally dissolves in the blood and passes out of the body in urine. But in people with gout, high blood levels of uric acid allow crystals to form in the joints and sometimes in the kidneys, where they create kidney stones.

Uric acid comes from the breakdown of substances called purines. Purines are naturally found in your body's tissues and in many foods. Eating purine-rich foods—such as organ meats, mussels, and mushrooms—can bring on or worsen a gout attack. Alcohol or stress can also trigger an episode.

Gout symptoms usually arise at night. It normally affects one joint at a time, often in the feet, hands, elbows, or knees.

"Gout primarily affects men who are middle aged or older," Choi says. "Postmenopausal women are at risk too, especially if they are obese or have high blood pressure or unhealthy dietary habits, such as drinking large amounts of alcohol or sugary soda."

The risk also rises if you have a family member with gout or if you take certain medicines, such as water pills (diuretics) or low-dose aspirin.

Early gout attacks tend to fade within a week. It may be months or even years before the next attack hits. But over time, gout may appear more often and last longer if left untreated.

Most people with gout can control their symptoms through lifestyle



changes and medications. Non-steroidal anti-inflammatory drugs (NSAIDs) can ease the swelling and pain of sudden attacks. Oral or injected steroids and a drug called colchicine can also help.

If frequent gout attacks become a problem, doctors may prescribe uric acid-lowering medicines. But once begun, these drugs often must be taken long term.

"If it's left untreated, gout can eventually lead to damage and deformity of the joints—a condition called chronic gout," says Choi. "In general, chronic gout arises only after many years of suffering."

If you have repeated attacks of pain and swelling in your joints, talk to a health care provider. "If you have gout, the earlier you're diagnosed and treated—along with making healthy lifestyle changes—the better off you'll be," says Choi. ■



Web Links

For more information about gout, click the "Links" tab at:

<http://newsinhealth.nih.gov/issue/Feb2014/Feature2>



Wise Choices If You Have Gout

To ease or prevent gout attacks:

- Eat a heart-healthy diet. Avoid foods that are high in purines (such as liver, dried beans and peas, gravy, and anchovies).
- Avoid high-fructose corn syrup-sweetened beverages and foods.
- Drink plenty of water, and limit alcohol.
- Exercise regularly and maintain a healthy weight.
- If you're overweight, ask your doctor how to lose weight safely. Fast or extreme weight loss can raise uric acid levels.
- Tell your health care provider about all the medicines and vitamins you take.
- Take prescribed medicines as directed.



Definitions

Inflammation

Swelling and redness caused by the body's protective response to injury.

Health Capsules

For links to more information, see these stories online:
<http://newsinhealth.nih.gov/issue/Feb2014/Capsule1>

Distracted Driving Raises Crash Risk

Video technology and in-vehicle sensors showed that distracted driving, especially among new drivers, raises the risk for car crashes and near crashes. The study also found that drivers eat, reach for the phone, text, or otherwise take their eyes off the road about 10% of the time.

In the United States, about 6% of drivers are 15 to 20 years old, but they're involved in about 10% of deadly car accidents and 13% of police-reported crashes that cause injury. Past studies suggest that doing something else while driving—such as eating, talking on the phone, or texting—raises the risk of a crash.

NIH-funded researchers analyzed the driving habits of both novice teen

and experienced drivers. Vehicles were equipped with 4 cameras that recorded video whenever the cars were moving. A suite of sensors recorded acceleration, sudden braking or swerving, and other data.

The team found that distracted driving put newly licensed teen drivers at great risk. Compared to when they weren't engaged in distracting tasks, novice teen drivers were 8 times more likely to crash or have a near miss when dialing a phone; 7 to 8 times more likely when reaching for a phone or other object; almost 4 times more likely when texting; and 3 times more likely when eating.

Experienced adults were more than twice as likely to crash or have

a near miss when dialing. However, other tasks were not linked to increased risk. The act of talking on a cell phone didn't itself raise the risk among adult or teen drivers. But problems can arise if you need to reach for the phone to answer or dial.

"Anything that takes a driver's eyes off the road can be dangerous," says study co-author Dr. Bruce Simons-Morton of NIH. "But our study shows these distracting practices are especially risky for novice drivers, who haven't developed sound safety judgment behind the wheel." ■

Caring for a Seriously Ill Child

When a child is diagnosed with a serious illness, it can be difficult for the entire family. It's important that your child, your family, and you get the support and care you need during this challenging time. A special type of care called palliative care can help.

Palliative care can ease a child's pain, help manage other symptoms, and provide important emotional support to the child and family. Research has shown that pediatric palliative care services may also improve overall satisfaction with care for patients and their families. Yet many health care providers hesitate to recommend palliative care for young patients, and parents and caregivers are often unaware of its benefits.

"Initiating palliative care conversa-

tions is often hard for both providers and families, especially in the pediatric setting," says Dr. Patricia A. Grady, director of NIH's National Institute of Nursing Research. While it may not be an easy conversation, she says, palliative care can greatly improve a patient's experience.

NIH's *Palliative Care: Conversations Matter* website provides information for health care providers, patients, and their families. The materials, including online videos, emphasize that palliative care works along with other treatments to enhance quality of life for children of any age living with a range of serious illnesses—not only at the end of life.

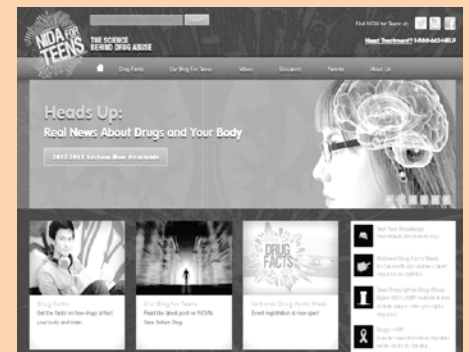
Visit www.ninr.nih.gov/conversationsmatter or call 301-496-0207 to learn more. ■



Featured Website NIDA for Teens

<http://teens.drugabuse.gov/>

Teens, and adults who care for them, can learn about addiction and drug abuse at this updated site from NIH's National Institute on Drug Abuse (NIDA). Designed for viewing on smartphones, tablets, and computers, the site's free, interactive resources include a teen blog, videos, educator guides, and lots of easy-to-read information about the science behind drug abuse.



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