

THE RISE OF SUPERBUGS

Dangerous infections that are resistant to antibiotics are spreading and growing stronger, with dire consequences

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The next time you're offered a prescription for antibiotics and ask yourself, "What harm could it do?" think about Peggy Lillis.

Five years ago, the 56-year-old kindergarten teacher from Brooklyn, N.Y., was given the antibiotic clindamycin, which was supposed to prevent a dental infection. Instead, the drug wiped out much of the “good” bacteria in her gut that normally keeps “bad” bacteria in check. Without that protection, harmful bacteria in her belly ran rampant, triggering an intestinal infection so severe that doctors had to perform emergency surgery to remove her colon. Despite that desperate, last-ditch effort, “within 10 days of taking those pills, my mother was dead,” says Lillis’ son, Christian.

Or consider Zachary Doubek, a rambunctious 12-year-old from New Brunswick, N.J. After a baseball game, Zachary came home complaining of knee pain that worsened overnight and quickly escalated. His doctor initially prescribed an antibiotic that failed to bring the problem under control. Zachary had the bad luck of running into a strain of bacteria that, after repeated exposure to antibiotics, had evolved, developing defenses against the drugs.

Zachary’s infection raced through his body, forcing doctors to put him in a medically induced coma until they could rein it in with vancomycin, a powerful antibiotic that, luckily, still worked against the germ. Zachary survived, but a year and six surgeries later, he still walks with a limp from the ordeal. “We may never know how he got infected,” says his mother, Marnie Doubek, M.D., a family physician, “but we know that the antibiotic that should have first helped him didn’t work.”



Zachary Doubek with his mother, Marnie Doubek, M.D.



Hear how Zachary Doubek got a life-threatening infection from just playing like a kid.

Scary New Superbugs

Peggy Lillis' and Zachary Doubek's stories are all too common. Though antibiotics have saved millions of lives since penicillin was first prescribed almost 75 years ago, it's now clear that unrestrained use of the drugs also has unexpected and dangerous consequences, sickening at least 2.25 million Americans each year and killing 37,000.

That harm comes in two main ways. First, as in Lillis' case, antibiotics can disrupt the body's natural balance of good and bad bacteria, which research shows is surprisingly important to human health. Lillis was killed by one such bad bug, the bacteria *C. difficile*. At least 250,000 people per year now develop *C. diff* infections linked to antibiotic use, and 14,000 die as a result.

Second, overuse of antibiotics breeds "superbugs"—bacteria that often can't be controlled even with multiple drugs. Doubek was a victim of MRSA (methicillin-resistant staphylococcus aureus), a bacteria once confined to hospitals that has now spread into the community, including nail salons, locker rooms, and playgrounds—where Doubek may have picked up his infection. MRSA and other resistant bacteria infect at least 2 million people in the U.S. annually, killing at least 23,000. (Read more about deadly hospital infections (<http://www.consumerreports.org/cro/magazine/2015/07/how-your-hospital-can-make-you-sick/index.htm>) and see our hospital ratings (<http://www.consumerreports.org/health/doctors-hospitals/hospital-ratings.htm>.)

As alarming as those numbers are, experts say things could get much worse, and fast. The Centers for Disease Control and Prevention has sounded the alarm about two threats: CRE (carbapenem-resistant enterobacteriaceae), which—when it gets into the bloodstream—kills almost 50 percent of hospital patients who are infected; and shigella, a highly contagious bacteria that overseas travelers often bring home and that is now resistant to several common antibiotics, raising fears of an outbreak in the U.S.

The World Health Organization and the European Union call the rise of resistant bacteria one of the world's most serious health crises, putting us on the verge of a "post-antibiotic era." In June, President Obama convened a forum on the crisis at the White House attended by 150 organizations, including Consumer Reports. And his 2016 proposed budget included \$1.2 billion for combatting resistant infections.

More From Consumer Reports

Read the other parts of our series: "Making the World Safe From Superbugs (<http://www.consumerreports.org/cro/health/making-the-world-safe-from-superbugs.htm>)" and "How Your Hospital Can Make You Sick (<http://www.consumerreports.org/cro/health/hospital-acquired-infections/index.htm>)." Plus, check our special report "How Safe Is Your Ground Beef?" (<http://www.consumerreports.org/cro/food/how-safe-is-your-ground-beef>)" and antibiotic resistance guide (<http://www.consumerreports.org/cro/health/antibiotic-resistance-guide/index.htm>).

2.25+ Million

Number of people sickened each year by misuse of antibiotics



How Antibiotics Can Kill

Christian Lillis (sitting) and his brother Liam outside their family home in Brooklyn, N.Y., with a picture of their mother Peggy. She died when an antibiotic prescribed after a routine root canal killed off "good" bacteria in her stomach, allowing a "bad" bacteria, *C. difficile*, to spread throughout her body. The family responded to the tragedy by creating the Peggy Lillis Memorial Foundation. (<http://peggyfoundation.org>)

37K+

people are killed each year by the misuse of antibiotics. Help support our work on eliminating this misuse

Donate

Miracle Drugs Gone Awry

“We have to act now to reverse this problem,” says Thomas R. Frieden, M.D., director of the CDC. “If we lose the ability to treat infection, we lose the ability to safely do much of what we take for granted in modern medicine.”

Part of the solution may come from developing new antibiotics. But experts say it’s even more important that doctors, hospitals, and consumers develop a new attitude to the drugs, learning when antibiotics should—and shouldn’t—be used.

That applies even to how the drugs are employed on farms: 80 percent of the antibiotics in the U.S. are actually fed to chickens, cows, and other food animals, mostly to speed their growth and to prevent disease.

Frieden and others say the problem, although complex, is fixable—if we act now. Here, what you need to know about antibiotic overuse and its consequences, and how to protect yourself and your family.

“Antibiotics really are miracle drugs. Patients believe that. I believe that,” says Lauri Hicks, D.O., head of the CDC’s program Get Smart: Know When Antibiotics Work.

Ask anyone who has had a brush with bacterial meningitis. About 85 percent of people treated with antibiotics for that infection survive; without the drugs, almost all die. In fact, many of the advances of modern medicine—organ transplants, invasive surgery, cancer therapy, among others—depend on antibiotics. For example, without the drugs up to 40 percent of people undergoing total hip-replacement would develop an infection and almost one-third of those would die.

But antibiotics have become a victim of their own success. “The drugs seemed so effective that we started using them even in cases when they shouldn’t be,” Hicks says. Overall, in fact, the CDC estimates that up to half of all antibiotics used in this country are prescribed unnecessarily or used inappropriately.



How Doctors Misuse Antibiotics

Antibiotic misuse happens in many ways:

Using the drugs to treat illnesses caused by viruses, not bacteria. Doctors know, of course, that antibiotics don’t work against viruses, like those that cause the common cold or the flu. But in some cases tests can’t help distinguish between the two. Or doctors may feel that they just don’t have the time to determine the cause, and figure “it’s better to be safe than sorry.” One recent study of 204 doctors suggested some physicians may be more likely to prescribe antibiotics for viral infections toward the end of their office hours—a sign they may be taking the easy route to handling patients’ complaints.

Prescribing the drugs just to satisfy patient demand. Doctors may also just want to make their patients happy—and patients often want antibiotics. For example, in a recent Consumer Reports poll of 1,000 adults, one in five people who got an antibiotic had asked for the drug. “I often have patients who ask for antibiotics,” says Marnie Doubek, who sees many sick children in her practice. “So I understand the pressure to just say OK. But now, especially with Zachary’s experience, no way.”

Rushing to drugs too quickly. Even when infections are caused by bacteria, doctors sometimes prescribe antibiotics when it might be wise to wait a few days to see whether mild symptoms clear up on their own. One example: ear infections in children older than 6 months. When mild, those

infections often improve untreated. But as many parents know, a crying child can be a powerful motivator to seek a quick fix even if, in the long run, repeated use of antibiotics may be more likely to cause problems than solve them.

Abusing broad-spectrum drugs. When antibiotics are called for, doctors often reach too quickly for “broad spectrum” ones that attack multiple bacteria types at once. That shotgun approach is not only more likely to breed resistance but also to wipe out protective bacteria. The drug that triggered Lillis’ *C. diff* infection, clindamycin, is one such drug.

Those drugs were developed with the thought that “killing as many bugs as you possibly can in every patient” was a good idea, says John Powers, M.D., former lead medical officer of Antimicrobial Drug Development and Resistance Initiatives at the Food and Drug Administration.

Doctors loved the broad-spectrum antibiotics and, spurred by aggressive marketing from drug companies, began using them for common problems such as ear and sinus infections. Given that widespread use, “it’s hardly a shock that we now have a problem with resistance and *C. diff*,” Powers says.

The Danger of New Drugs

Many of those broad-spectrum drugs were introduced 30 years ago, when antibiotic development was in its heyday. More than 50 antibiotics were introduced in the 1980s and 1990s. But that once-steady drug pipeline has slowed to a trickle, for several reasons.

One is that coming up with new classes of antibiotics that target superbugs is proving to be a tough scientific puzzle. Most of the new antibiotics introduced since 2000 have been minor tweaks to existing drugs, not major breakthroughs.

The other big reason? Money. “Developing antibiotics is not that profitable,” says Henry Chambers, M.D., an infectious disease specialist at the University of California San Francisco School of Medicine. Drug companies would rather focus on medications that many people take for a long time, he explains, because the market, and profit potential, is larger.

The government is trying to sweeten the economic incentive. In 2012, the FDA began to fast-track certain antibiotics and told drugmakers that patent protection on the drugs would last an additional five years. Since then, 49 new drugs have entered the pipeline's fast lane and six have been approved.

The FDA has proposed further streamlining—allowing companies to test drugs using smaller, shorter, or fewer studies—for antibiotics that are meant to treat serious infections in patients with no other options. Legislation now with Congress would also lower the requirements needed to get new antibiotics on the market.

When Big Pharma Pushes Drugs

That approach means the FDA “is willing to accept less safety and efficacy data,” acknowledges Edward Cox, M.D., director of the Office of Antimicrobial Products in the FDA's Center for Drug Evaluation and Research. But he says that's a trade-off that many doctors are willing to make.

Still, some researchers and patient advocates worry about fast-tracking drugs. “We absolutely need new antibiotics,” says Lisa McGiffert, director of Consumer Reports' Safe Patient Project. “But that doesn't justify lowering the bar on the standards for drug approval. These can be dangerous drugs, so they should be thoroughly tested for safety and efficacy before we unleash them on the public.”

Perhaps the biggest concern is that even if effective new antibiotics make it to market, they may not provide much long-term help if health care professionals and patients continue to misuse the drugs. And, Chambers says, there may be pressure on doctors to use the drugs widely, despite the growing threat of antibiotic resistance.

Some pressure may come from drug companies, which have a history of marketing new drugs aggressively, and even illegally. Pfizer agreed to pay \$1 billion in 2009 to settle allegations that the company illegally promoted four drugs, including the antibiotic linezolid (Zyvox), which was pushed to treat forms of MRSA for which it was not approved.

A History of Antibiotics: From Good To Bad

Alexander Fleming discovered penicillin in

1928, doctors first prescribed it in 1942, and by 1948 Fleming was already warning about the risk of resistant bacteria—a prediction that became all too true over the following decades.

1930

1928

Penicillin discovered
by Alexander Fleming



1935

1940

1942

1942 First U.S. patient
treated with penicillin

1945

1947

Penicillin-resistant
infections reported

1950

1955



1958 Vancomycin approved
to treat resistant bacteria

1960

1960's

Antibiotic-resistant salmonella
identified in food
animals and humans

1965

1968

1968

1970

MRSA, a bacteria resistant to several antibiotics, first identified in a U.S. hospital patient

1975

1977

FDA proposes revoking uses of penicillin and tetracyclines in animal feed

1980

1985

1986

Vancomycin-resistant enterococci (VRE) reported

1990

1995



2000

1999

Synercid approved to treat certain vancomycin-resistant bacteria

2005

2005

FDA blocks use of a fluoroquinolone antibiotic in poultry because of resistance

2010

2015

2013

CDC reports at least 23,000 people per year

die from resistant infections,
including MRSA

See How Antibiotic-Resistant Bacteria Reach You

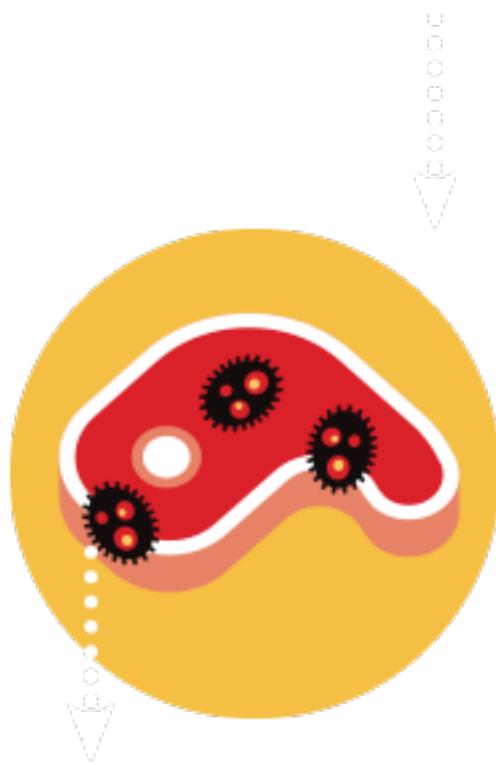


A person goes to a hospital for care and is infected by bacteria resistant to antibiotics, possibly bringing the infection home when discharged.

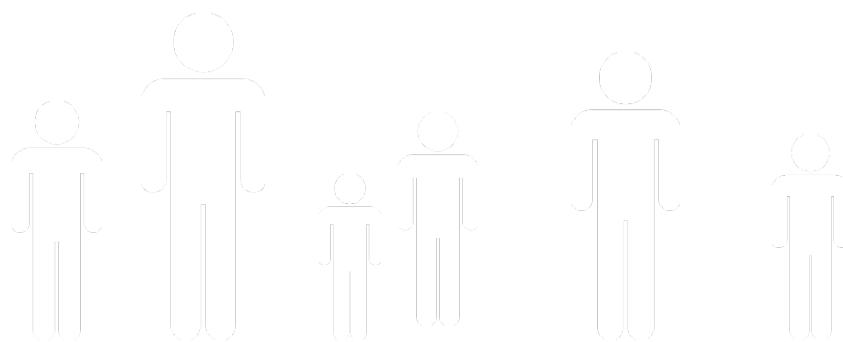


A person goes to a doctor or dentist and is prescribed antibiotics. That can breed bacteria resistant to the drug, so it is less likely to work later when needed.





Animals are fed antibiotics, mostly to help them grow faster. That can breed resistant bacteria, which get passed to humans via food or through water and runoff to the environment.



The Real Antibiotic Solution

With education and a little prodding, doctors have shown that they can do better.

One study, in the *Journal of the American Medical Association*, found that doctors who attended a 1-hour session on guidelines for treating common upper-respiratory tract infections and then received feedback on their prescribing habits, cut their use of broad-spectrum antibiotics almost in half. Inappropriate prescriptions for sinus infections and pneumonia were cut by 50 to 75 percent.

Several medical organizations, such as the American Academy of Family Physicians and the American Academy of Pediatrics, have distributed guidelines on appropriate antibiotic use to their members. In some cases, that advice is incorporated into electronic medical records, so doctors are alerted if they prescribe a drug inappropriately.

Still, patients play a key role, too, by helping to make sure those drugs are used only when necessary, and by avoiding infections in the first place. Here are a few guidelines to follow:



Your Advertising Choices

How does it work?

5 Big Myths About Antibiotics

Don't push for antibiotics. If your doctor says you don't have a bacterial infection, don't insist. Ask about other treatments that can help you feel better, such as a pain reliever, throat soother, antihistamine, or decongestant.

Ask whether you can fight it off on your own. If bacteria are the cause but your symptoms are mild, ask about trying to fight off the infection without drugs.

Request targeted drugs. When possible, your doctor should order cultures to identify the bacteria that caused your infection and prescribe a drug that targets that bug.

Use antibiotic creams sparingly. Even antibiotics applied to the skin can lead to resistant bacteria. So use over-the-counter ointments containing bacitracin and neomycin only if dirt remains after cleaning with soap and water.

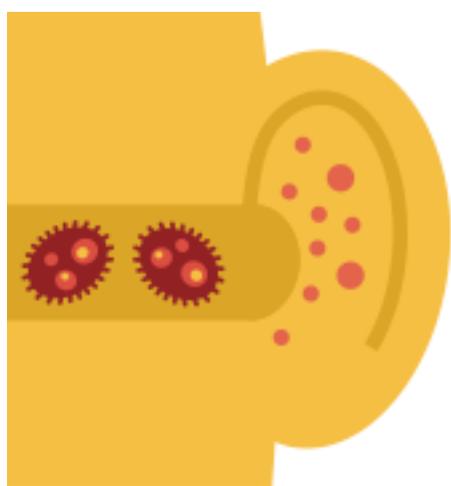
Avoid infections in the first place. That means staying up to date on vaccinations. And it means washing your hands thoroughly and regularly, especially before preparing or eating food, before and after treating a cut or wound, and after using the bathroom, sneezing, coughing, and handling garbage. Plain soap and water is best. Avoid antibacterial hand soaps and cleaners, which may promote resistance.

What CR Wants

- Doctors to stop over-prescribing
- Hospitals to clean up their acts
- Farmers to stop using needless antibiotics

When to Say No to Antibiotics

An April 2015 Consumer Reports survey of 1,000 adults found that patients are often prescribed antibiotics when these drugs aren't really necessary, such as for colds, sinus infections, and before dental or medical procedures. Several major medical organizations, including the American Academy of Family Physicians and the American Academy of Pediatrics, have recently tried to correct the problem by identifying conditions for which antibiotics are often misused, and explaining when the drugs are, and aren't, needed:



EAR INFECTIONS

Most ear infections improve on their own in two to three days even without drugs, especially in children 2 or older.

When to consider antibiotics: The drugs may be needed right away for babies 6 months or younger with ear pain, children from 6 months to



ECZEMA

Antibiotics don't help relieve skin from itching or redness. Instead, moisturize skin or ask your doctor to recommend a medicated cream or ointment.

When to consider antibiotics: If there are signs of a bacterial infection, such as bumps or sores, or if there is pus, honey-colored crusting, very red or

2 years old with moderate to severe ear pain, and skin, and fever.
children 2 or older with severe symptoms.

Read more about when antibiotics are really needed. (<http://consumerhealthchoices.org/depth-antibiotics/>)

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