How COVID spawned a surge in superbugs, and what we can do about it

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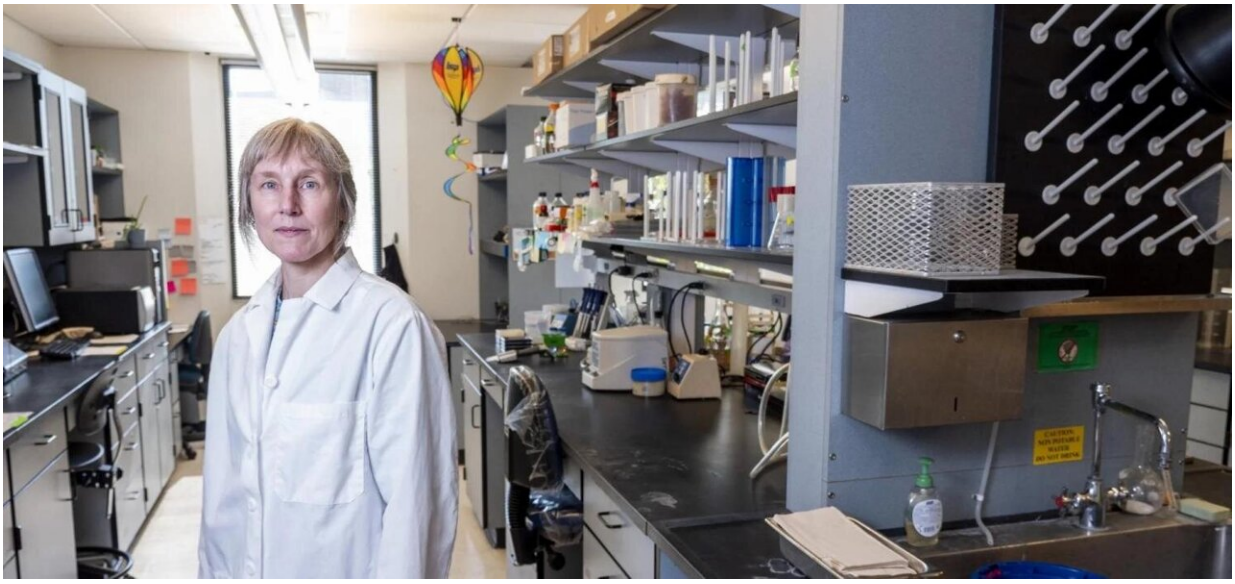

Corrie Detweiler, a professor of molecular, cellular and development biology at CU Boulder, is working to discover new compounds to address the growing threat of superbugs. Credit: University of Colorado at Boulder

After years of progress in the battle against antimicrobial-resistance, so-called "superbugs" have made a concerning comeback in the age of COVID, with resistant hospital-onset infections and deaths soaring at least 15% in the first year of the pandemic alone, according to a new Centers for Disease Control report.

Each year, about 3 million people in the U.S. are infected with germs, like bacteria and fungi, that have developed resistance to the drugs designed to kill them. About 50,000 people die from these threats, often acquired in the very healthcare facilities designed to treat them. By 2050, some scientists predict, there could be more deaths from antibiotic resistance than from cancer.

Corrie Detweiler, a professor of molecular, cellular, and developmental biology at CU Boulder, has spent her career trying to develop solutions to what some call "the shadow pandemic" of antimicrobial-resistance. CU Boulder Today spoke with her about why so many antimicrobial drugs won't work anymore, how COVID made things worse and what can be done to make things better.

How long have antibiotics been around, and how big of an impact did they have?

Modern antibiotics were discovered in 1928, with penicillin, but it wasn't until World War II that they started to be made in large amounts in the U.S. to treat soldiers. That demonstrated their true potential—many people who would have died from infections from battle wounds survived. Since then, they have had a massive impact. They have helped people to survive basic things like childbirth or falling on the playground or having minor surgery. Prior to antibiotics, people used to routinely die from those things, and as they stop working, such activities are going to become much more risky. You might think harder before you get your hip replaced. When your friend goes into childbirth, you might be concerned you won't see her alive again. We risk going back to a period 100 years ago when even a minor infection could mean death. It would radically change our lives.

What is a superbug, and how common are they?

A superbug is a bacterium or fungi that is resistant to clinical antimicrobials. They are increasingly common. Right now, for instance, the percentage of clinical isolates of Enterobacteriales (which includes things like Salmonella and E. coli) that are known to be resistant is around 35%. So, if you go into a hospital and get an infection like this, you have about a one in three chance of being either untreatable or not very treatable.

Prior to the pandemic, how were we doing in addressing this issue?

A lot of progress had been made, particularly in hospital-acquired infections, based on a better understanding of the problem and better guidelines about when to use antibiotics. Between 2012 and 2017, for instance, deaths from antimicrobial resistance fell by 18% overall and nearly 30% in hospitals. That all fell apart during COVID.

Why? How did COVID spawn an uptick?

We didn't know how to treat COVID, and, understandably, there was a fair amount of chaos in the medical system. People were using antibiotics more, often inappropriately. About 80% of COVID patients received antibiotics. People were given them prophylactically, prior to knowing they had a lung bacterial infection. That's not to say that none of (the patients) needed them. Some did. But the more you use antibiotics, the more you select for resistance. And that's how you eventually get a superbug.

What harm is it for me to take an antibiotic that I may not need, 'just in case?'

When you take an antibiotic that you don't need, you are essentially putting pressure on other microbes in your body to grow stronger. That could make you sick later or make someone in your household sick.

You're also selecting for resistant bacteria that you evacuate out into the water system and can potentially spread antibiotic resistance. And then there is also a more selfish component, which is that antibiotics kill off your microbiota—the beneficial bacteria we all have within our nasal passages and our GI tract to keep us healthy. That makes you more vulnerable to illness.

What can society do to address this?

First, we need to go back to this idea of stewardship in hospitals—to only give out antibiotics when there is a clear need. We were doing the right thing. And then something terrible came along and messed it up, and it demonstrated that what we were doing was working well. That's a good thing. Second, we need to discover and develop novel classes of antibiotics. The last time a new class of antibiotics hit the market was in 1984. The fundamental problem is that they're not profitable to develop, compared to say a cancer drug. You can go to the drugstore and get a course of amoxicillin for $8. We need programs that reward industry and academic labs like ours for doing the early research.

What does your lab do?

We're using basic biology to try to figure out new ways to kill bacteria during an infection and identify compounds that work differently than existing drugs.

What can individuals do?

Don't pressure your doctor for an antibiotic unless there's evidence that you need one, and if your doctor does want to prescribe them ask why you need them. They should be able to explain why. If you do need one, take the whole course.

Provided by University of Colorado at Boulder