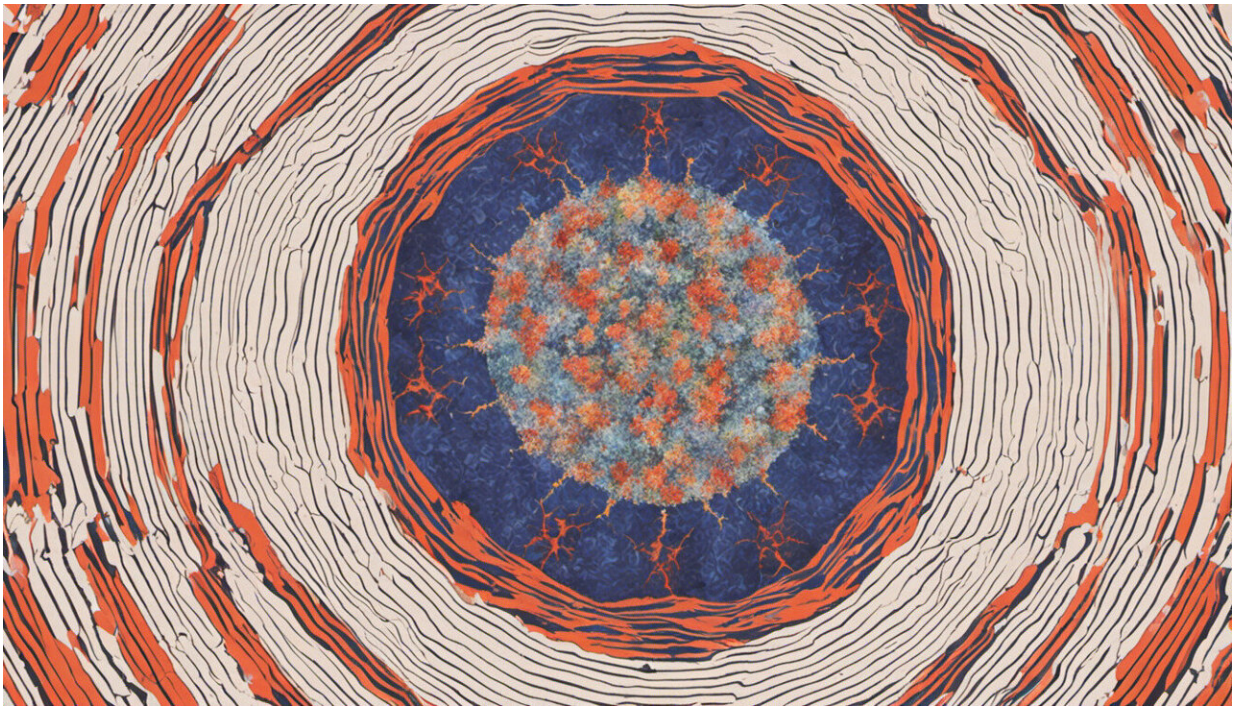
# How do you know you've been prescribed the right antibiotics?

January 22 2020, by Christine Carson



Credit: AI-generated image (disclaimer)

In the days before antibiotics, deaths from bacterial infections were common. Seemingly minor illnesses could escalate in severity, becoming deadly in a matter of hours or days.

These days, antibiotics can be lifesavers. In the community, they're

commonly used to treat bacterial infections of the lung, urinary tract, eye, throat, skin and gut.

But they're not needed for *all* bacterial infections—many infections will resolve on their own without treatment.

And of course, antibiotics don't treat viral infections such as colds and flus, or fungal infections such as tinea or thrush.

Even when antibiotics are necessary, they're not a one-size-fits-all treatment: not all antibiotics kill all types of bacteria.

## What type of bacteria is causing the infection?

If your doctor suspects you have a serious bacterial infection, they will often take a urine or blood test, or a swab to send to the pathologist.

At the lab, these tests aim to detect and identify the bacteria causing the infection.

Some methods only need to detect bacterial DNA. These DNA-based approaches are called "genotypic methods" and are quick and highly sensitive.

Other methods involve attempting to culture and isolate bacteria from the sample. This can take one to four days.

## What antibiotic can fight the infection?

If antibiotic treatment is necessary, the isolated bacteria can be used in a second series of tests to help determine the right antibiotic for your infection. These are called antimicrobial susceptibility tests.

Like the tests that first detected the bacterium causing your infection, they can be done using DNA-based (genotypic) methods or by culturing the bacterium in the presence of various antibiotics and assessing what happens (phenotypic methods).

Genotypic tests tend to identify which antibiotics won't work so they can be ruled out as treatment options; ruling out the ones that won't work leaves the ones that *should* work.

For phenotypic tests, the bacterium is regrown in the presence of a range of antibiotics to see which one stops its growth. A range of concentrations of each antibiotic are often used in these tests.

## Why you sometimes get a script without testing

Whichever tests are done, the results may not be available for a couple of days. In the meantime, your doctor will probably get you started on an antibiotic that is *most likely* to be effective. This is called empiric therapy and is the "best guess" treatment while they wait for test results.

Empiric antibiotic choice is based on the doctor's prior experience with that type of infection, as well as clinical guidelines developed from evidence about that infection type, and ongoing surveillance data from the pathology lab about the types of bacteria generally causing that infection, and which antibiotics those bacteria are susceptible to.

When available, the test results will either confirm the initial choice, or influence the doctor's decision to prescribe a different antibiotic.

Take urinary tract infections (UTIs), for example. Most are caused by *E. coli* and there are antibiotics that reliably treat these infections.

Data from the thousands of pathology tests performed each year on the

*E. coli* from other people's UTIs helps inform the doctor's choice of empiric antibiotic for you, as do the clinical guidelines.

The doctor can therefore be reasonably confident in prescribing that antibiotic while you wait for the test results from your urine sample. You'll either get better and need no further intervention, or you'll come back to the doctor, by which time your test results should be available to fine-tune the choice of antibiotic.

## Why it's important to get the right antibiotic

Naturally, you want to receive an antibiotic that will effectively treat your infection. But what's wrong with taking an antibiotic that does the job too well or, conversely, is ineffective?

Antibiotics that are too strong will not only clear your infection but will also kill other good bacteria, disrupting your microbiome and possibly causing other knock-on effects.

On the other hand, an ineffective antibiotic will not only fail to treat the infection adequately, it can still cause side effects and disrupt your microbiome.

A broader consideration for the judicious use of antibiotics is that overuse, or ineffective use, contributes unnecessarily to the development of antibiotic resistance. All antibiotic use promotes resistance in other bacteria they come in contact with, so minimizing and optimizing their targeted use is important.

The right antibiotic choice for your infection is a complex decision that must often be made before key additional evidence to support the decision is available.

As test results become available, the treatment antibiotics may be refined, changed or even stopped.



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