

Overuse of antibiotics tied to increase in painful gut infection

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Better antimicrobial stewardship could curb infection rates. Credit: Global Panorama/Flickr, CC BY-SA

Going to the hospital can save your life, but it is not without risks. Patients can be exposed to dangerous infections while receiving treatment. In the United States, health care-associated infections are the fifth leading cause of death among hospitalized patients, accounting for [nearly 100,000 deaths](#) in the US each year.

Clostridium difficile is the most common bacterium contributing to health care-associated infections. It can colonize the gut and result in an [intestinal disease](#) called *Clostridium difficile* infection (CDI). CDI infection rates are going up, and the increase is tied to overuse of commonly used antibiotics.

CDI causes mild diarrhea or more serious symptoms like [abdominal pain](#) and fever. In the most severe forms, CDI can result in severe inflammation of the [intestines](#) or even [death](#). Approximately 9% of patients hospitalized with CDI die, compared to 2% for all other inpatients. Patients with CDI are often hospitalized at least one week, resulting in a mean cost per hospital stay of US\$24,400.

Our team [analyzed](#) 2.2 million adult hospital discharges for CDI from 2001 to 2010, taken from the [US National Hospital Discharge Surveys](#).

We found that the CDI incidence nearly doubled in US hospitals between 2001 and 2008, but leveled off between 2008 and 2010. The incidence of CDI increased from 4.5 patients discharged following a CDI episode per 1,000 total adult discharges in 2001 to 8.6 in 2008, before dipping slightly to 8.2 in 2010. Deaths increased slightly, from 6.6% in 2001 to 7.2% in 2010. Over the course of the study the median hospital stay was eight days.

Antibiotics to blame

Other health care-associated infections, like catheter-associated infections and surgical site infections, are associated with the use of medical devices and surgical procedures. Hand washing and device disinfection are the primary means to preventing those infections.

In contrast, antibiotic use is the primary risk factor for developing CDI. This is because antibiotics disrupt the normal gastrointestinal bacteria,

allowing *C. difficile* to increase rapidly.

Every class of antibiotic has been associated with the development of CDI, but with varying degrees of risk. Some of the antibiotics with the highest CDI risk are fluoroquinolones and cephalosporins, which are often used to treat common bacterial infections like pneumonia and urinary tract infections.

Excessive and inappropriate prescribing of antibiotics has likely contributed to the increase in CDI in recent years. The US Centers for Disease Control and Prevention has estimated that as much as 50% of all prescribed antibiotics are [unnecessary](#).

In another [study](#) we found that the use of broad-spectrum antibiotics doubled in the US between 2000 and 2010, which is consistent with the increase in CDI we found in our study.

Importantly, this study also found that all antibiotic use increased in elderly patients. These patients have a higher risk for CDI because they have weaker immune systems, co-occurring health conditions and spend more time in the health care system. Appropriate use of antibiotics is especially important for elderly patients.

Treatment and prevention

Since *C. difficile* is a bacteria, antibiotics are also used to treat CDI. The antibiotics used as mainstay treatments for CDI for decades have been associated with high rates of recurrence. This is because antibiotics, while killing *C. difficile*, also kill other good bacteria in the gut, allowing *C. difficile* to grow and cause infection once again.

Emerging treatments for CDI, like fecal transplant, might overcome the limitations of traditional antibiotic therapies. A fecal transplant involves

taking a sample of feces from a healthy donor and putting it in the patient's gut, usually through an enema or tube that runs through the nose to the gut.

More recently, scientists and clinicians have been able to place the donor feces in a [capsule](#) to ease administration. This process helps to restore the normal good bacteria in the gut, while limiting *C. difficile* overgrowth. Studies have found fecal transplants to be [safe and effective](#) for treating recurrent CDI, but larger studies are needed before it becomes more widely used in clinical practice.

Antimicrobial stewardship programs play a critical role in curbing CDI. These programs are designed to improve the appropriate use of antimicrobials by selecting the optimal drug regimen, dose, duration of therapy and route of administration. They aim to achieve optimal clinical outcomes for [patients](#), while limiting antimicrobial overuse and reducing health care costs.

Numerous [reports](#) have shown a reduction in CDI incidence following implementation of antimicrobial stewardship programs or specific antimicrobial restriction policies. The CDC estimates that reducing the use of broad-spectrum [antibiotics](#) by 30% [could reduce CDI by 26%](#). In 2014, the CDC recommended that all acute care hospitals implement antimicrobial stewardship programs.

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