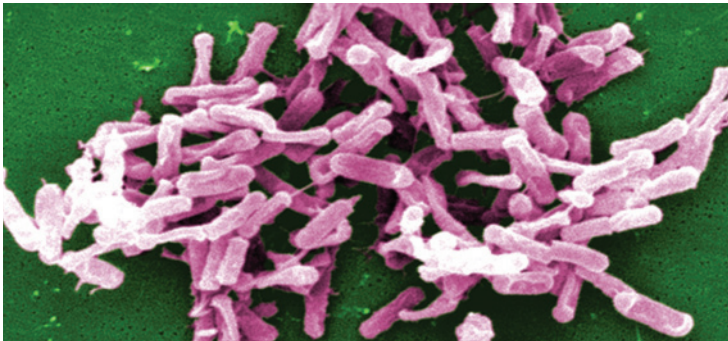


C. DIFF CLOSTRIDIUM DIFFICILE



Clostridium difficile, more commonly known as *C. diff*, is derived from the Greek, meaning "difficult spindle." (Credit: Janice Haney Carr, CDC)

Rapidly Emerging Bacteria that Flourish in the Face of Antibiotics

What Causes *C. Diff*-Related Infections?

C. diff resides in the intestines of up to 3 percent of healthy adults without causing any symptoms.^{4,5}

When a patient takes antibiotics to treat another infection, those drugs may alter the normal balance of intestinal bacteria, allowing *C. diff* to flourish and release toxins that can cause severe diarrhea and inflammation of the colon.⁶

Reports of *C. diff*-related infections (CDI) are increasing in populations that include pregnant women, children, and those who have not been under medical care.^{7,8,9,10}

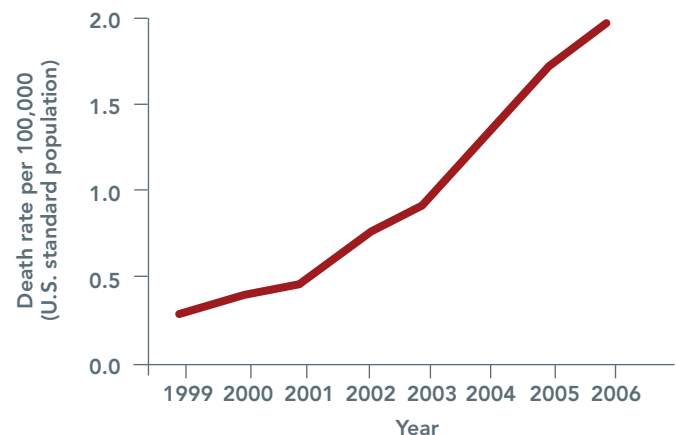
Learn more and get involved at WWW.PEWHEALTH.ORG/ANTIBIOTICS.

The Pew Health Group's Antibiotics and Innovation Project addresses the growing public health challenge of multidrug-resistant infections by supporting policies that stimulate and encourage the development of antibiotics to treat life-threatening illnesses.

Vital Statistics

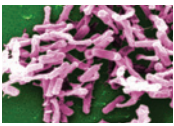
- Nearly 45,000 Americans died from CDI between 1999 and 2009.¹
- Seniors are especially at risk. More than 90 percent of deaths from CDI in 2009 occurred in those 65 years and older.²
- The estimated annual costs of CDI to the U.S. economy may reach \$1.8 billion each year, with median per-patient costs as high as \$40,000.³

Age-Adjusted Death Rate in the United States from *C. Diff*-Related Infection¹⁶



Treatment Options

- To treat CDI, antibiotic use must be restricted to metronidazole or, if that fails, vancomycin. Resistance to metronidazole and intermediate resistance to vancomycin has been reported.^{11,12}
- In May 2011, the U.S. Food and Drug Administration approved fidaxomicin, the first new antibiotic in more than 25 years to treat diarrhea caused by CDI.^{13,14}
- In severe cases, the only effective treatment for CDI is surgery to remove the infected portion of the patient's intestines.¹⁵



C. DIFF: CLOSTRIDIUM DIFFICILE

The information provided here is for general educational and informational purposes only. In no way should it be considered as offering medical advice, and it is not intended nor implied to be a substitute for professional medical advice. Please consult your health care provider to determine the appropriateness of the information for your own situation or if you have any questions regarding a medical condition or treatment plan.

¹ National Vital Statistics System, Centers for Disease Control and Prevention. "GMWKI: Total deaths for each cause by 5-year age groups, United States, 1999-2006+," last modified November 12, 2009, www.cdc.gov/nchs/nvss/mortality/gmwki.htm; J. Xu et al., "Deaths: Final Data for 2007," *National Vital Statistics Reports* 58, no. 19 (2010); K.D. Kochanek et al., "Deaths: Preliminary Data for 2009," *National Vital Statistics Reports* 59, no. 4 (2011).

² K.D. Kochanek et al., "Deaths: Preliminary Data for 2009."

³ S.M. McGlone et al., "The Economic Burden of *Clostridium difficile*," *Clin Microbiol Infect* (2011).

⁴ R. Ricciardi et al., "Increasing Prevalence and Severity of *Clostridium difficile* Colitis in Hospitalized Patients in the United States," *Arch Surg* 142, no. 7 (2007): 624-31; discussion 31.

⁵ F. Barbut and J.C. Petit, "Epidemiology of *Clostridium difficile*-Associated Infections," *Clin Microbiol Infect* 7, no. 8 (2001): 405-10.

⁶ V.K. Viswanathan, M.J. Mallozzi, and G. Vedantam, "*Clostridium difficile* infection: An overview of the disease and its pathogenesis, epidemiology and interventions," *Gut Microbes* 1, no. 4 (2010): 234-42.

⁷ H. Pituch, "*Clostridium difficile* is no longer just a nosocomial infection or an infection of adults," *Int J Antimicrob Agents* 33 Suppl 1 (2009): S42-5.

⁸ "Severe *Clostridium difficile*-Associated Disease in Populations Previously at Low Risk—Four States, 2005," *MMWR Morb Mortal Wkly Rep* 54, no. 47 (2005): 1201-5.

⁹ P.K. Kutty et al., "Risk Factors for and Estimated Incidence of Community-Associated *Clostridium difficile* Infection, North Carolina, USA," *Emerg Infect Dis* 16, no. 2 (2010): 197-204.

¹⁰ A.N. Ananthakrishnan, "*Clostridium difficile* infection: epidemiology, risk factors and management," *Nat Rev Gastroenterol Hepatol* 8, no. 1 (2011): 17-26.

¹¹ T. Pelaez et al., "Reassessment of *Clostridium difficile* Susceptibility to Metronidazole and Vancomycin," *Antimicrob Agents Chemother* 46, no. 6 (2002): 1647-50.

¹² A. Dworzynski, B. Sokol, and F. Meisel-Mikolajczyk, "Antibiotic resistance of *Clostridium difficile* isolates," *Cytobios* 65, no. 262-263 (1991): 149-53.

¹³ U.S. Food and Drug Administration, "FDA approves treatment for *Clostridium difficile* infection," news release, May 27, 2011, www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm257024.htm.

¹⁴ A. Pollack, "F.D.A. Approves Drug to Treat Hospital Scourge," *New York Times*, May 27, 2011, www.nytimes.com/2011/05/28/health/28drug.html.

¹⁵ R.M. Dallal et al., "Fulminant *Clostridium difficile*: An Underappreciated and Increasing Cause of Death and Complications," *Ann Surg* 235, no. 3 (2002): 363-72.

¹⁶ Based on data from, M.P. Heron et al., "Deaths: Final Data for 2006," *National Vital Statistics Reports* 57, no. 14 (2009).