



# Unnecessary Antibiotic Use and Patient Safety: The Role of Antibiotic Stewardship

## Overview

Like any medication, antibiotics carry certain risks. While critical for treating a wide range of infections, these drugs also increase a patient's risk of developing *Clostridium difficile* infections or experiencing an adverse drug event, such as an allergic reaction. Because of these risks, it is important to use antibiotics only when medically necessary. However, many antibiotics prescribed in the United States are unnecessary or inappropriate.<sup>1</sup> Improved antibiotic stewardship is needed, not only to curb the threat of antibiotic resistance but also to avoid exposing patients to unnecessary risks.

## Risk of *C. difficile*

The use of antibiotics can put patients at an increased risk for developing *C. difficile* infections, which can sometimes result in life-threatening diarrhea. One hospital-based study found that use of a broad-spectrum antibiotic (a drug that acts against a wide range of bacteria) nearly tripled a patient's risk of *C. difficile* infection.<sup>2</sup> An analysis of multiple studies found that patients who received antibiotics were seven times more likely to contract a community-acquired *C. difficile* infection compared with patients who had not received antibiotics.<sup>3</sup> Community-associated infections occur in patients with no recent health care exposure.<sup>4</sup>

The Centers for Disease Control and Prevention considers *C. difficile* an "urgent threat" to the nation's public health system.<sup>5</sup> A recent study estimated nearly 500,000 *C. difficile* infections in the United States in 2011, resulting in 15,000 deaths.<sup>6</sup> *C. difficile* infections can occur at any age but are most frequent in people 65 and older.<sup>7</sup> The death rate associated with these infections is also significantly higher among older patients, particularly for *C. difficile* infections associated with health care settings.<sup>8</sup> Recurrent *C. difficile* infections are a particular concern, because repeated infections create ongoing sources for transmission of the bacteria.<sup>9</sup>

## Occurrence of adverse drug events

Antibiotic use is also associated with a number of other adverse drug events, which are estimated to cause more than 140,000 emergency room visits a year.<sup>10</sup> The majority of these visits are due to allergic reactions, which can range from minor rashes to life-threatening responses. Antimicrobials are the most common cause of adverse events in children, accounting for nearly 30 percent of ER visits (mostly due to penicillins and cephalosporins).<sup>11</sup>

## Role of antibiotic stewardship in improving patient safety

Antibiotic stewardship programs are essential for minimizing the inappropriate use of antibiotics across health care settings. These programs aim to ensure that antibiotics are used only when indicated—that is, to treat bacterial infections—and at the right dose and duration of therapy. The potential impact these programs can have on patient safety is clear.<sup>12</sup> One study estimated that a 30 percent reduction in broad-spectrum antibiotic use in hospitals could result in a 26 percent reduction in hospital-associated *C. difficile* infections.<sup>13</sup>

The CDC has published core elements of stewardship programs to guide hospitals in the development and implementation of these programs.<sup>14</sup> Beyond hospitals, long-term care facilities and outpatient offices can also implement interventions tailored to their needs and resources.

The use of antibiotics will always carry a risk, both to public health and individual patients. However, increased stewardship efforts can help minimize the risk by ensuring that antibiotics are used responsibly.

## Endnotes

- 1 U.S. Centers for Disease Control and Prevention, *Antibiotic Resistance Threats in the United States, 2013* (2013), <http://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>.
- 2 Scott Fridkin et al., "Vital Signs: Improving Antibiotic Use Among Hospitalized Patients," *Morbidity and Mortality Weekly Report* 63, no. 9 (2014): 194–200, [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6309a4.htm?scid=mm6309a4\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6309a4.htm?scid=mm6309a4_w).
- 3 Abhishek Deshpande et al., "Community-Associated *Clostridium difficile* Infection and Antibiotics: A Meta-Analysis," *Journal of Antimicrobial Chemotherapy* 68 (2013): 1951–1961, <http://dx.doi.org/doi:10.1093/jac/dkt129>.
- 4 U.S. Centers for Disease Control and Prevention, "Technical Information – *Clostridium difficile* Tracking," last updated Dec. 14, 2015, [http://www.cdc.gov/hai/eip/cdiff\\_techinfo.html](http://www.cdc.gov/hai/eip/cdiff_techinfo.html).
- 5 U.S. Centers for Disease Control and Prevention, *Antibiotic Resistance Threats*.
- 6 Fernanda C. Lessa et al., "Burden of *Clostridium difficile* Infection in the United States," *New England Journal of Medicine* 372 (2015): 825–834, <http://dx.doi.org/doi:10.1056/NEJMoa1408913>.
- 7 Ibid.
- 8 Ibid.
- 9 Ibid.
- 10 Nadine Shehab et al., "Emergency Department Visits for Antibiotic-Associated Adverse Events," *Clinical Infectious Diseases* 47 (2008): 735–743, <http://dx.doi.org/10.1086/591126>.
- 11 Florence T. Bourgeois et al., "Pediatric Adverse Drug Events in the Outpatient Setting: An 11-Year National Analysis," *Pediatrics* 124, no. 4 (2009): e744–e750, <http://dx.doi.org/10.1542/peds.2008-3505>.
- 12 Pranita D. Tamma, Alison Holmes, and Elizabeth Dodds Ashley, "Antimicrobial Stewardship: Another Focus for Patient Safety?" *Current Opinion in Infectious Diseases* 27, no. 4 (2014): 348–355, <http://dx.doi.org/10.1097/QCO.0000000000000077>.
- 13 Fridkin et al., "Vital Signs," 194–200.
- 14 U.S. Centers for Disease Control and Prevention, *Core Elements of Hospital Antibiotic Stewardship Programs*, last updated May 7, 2015, <http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html>.

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