



Tom Merton/Getty Images

# What Drives Inappropriate Antibiotic Use in Outpatient Care?

Behavioral science strategies can help improve antibiotic prescribing habits

## Overview

Inappropriate antibiotic prescribing is common in outpatient settings across the United States. A recent study by the Centers for Disease Control and Prevention and The Pew Charitable Trusts found that nearly 1 in 3 antibiotics prescribed at outpatient facilities—including physician's offices, emergency departments, and hospital-based outpatient clinics—is unnecessary,<sup>1</sup> equaling 47 million prescriptions each year. Reducing this inappropriate prescribing is a critical step toward minimizing the development of antibiotic-resistant bacteria. By understanding the factors that affect physicians' antibiotic prescribing decisions and applying concepts from the social and behavioral sciences to stewardship strategies, stakeholders can more effectively minimize inappropriate prescribing, which in turn helps to reduce the threat of resistance.

Deciding whether to prescribe an antibiotic can be a complex process, during which physicians are influenced not only by medical information, but also by their interactions with patients, the uncertainties that surround medical decision-making, and the organizational challenges of delivering care in busy outpatient settings. In order to design effective antibiotic stewardship interventions that ensure these drugs are prescribed appropriately, public health stakeholders need to understand the underlying factors that can affect a physician's prescribing decisions.

## Factors that influence prescribing decisions

### Patient satisfaction and pressure

Patient demand is often cited as a driver of antibiotic prescribing.<sup>2</sup> Patients or their families may expect to get a prescription at an office visit, even when an antibiotic is not necessary. They may wrongly believe that antibiotics can relieve symptoms similar to those they've experienced in the past, such as a high fever.<sup>3</sup> Interviews with physicians reveal that some have been swayed by this perceived pressure to prescribe unnecessary antibiotics.<sup>4</sup> One study found that physicians were much more likely to prescribe antibiotics to pediatric patients when they believed the child's parents expected them to, regardless of the diagnosis or the parents' actual expectations.<sup>5</sup>

Patient pressure may be particularly influential in a physician's decision-making because doctors relate to patients as both a caretaker and service provider. As such, they must be conscious of both patient health and customer satisfaction. In interview-based studies, clinicians report that they sometimes prescribe antibiotics owing to concerns about appearing to have done nothing for their patients or out of fear of losing patients to competitors.<sup>6</sup> Some physicians may believe that prescribing antibiotics will increase patient satisfaction with the office visit.<sup>7</sup> Others believe that there is little use in refusing to prescribe an antibiotic, since patients can simply go to another doctor to get a prescription.<sup>8</sup> Physicians may feel ill-equipped—both in terms of time and resources—to counter perceived patient pressure.

### Antibiotic Prescribing by Other Health Care Providers

While the studies cited in this issue brief focus on the drivers of antibiotic prescribing by physicians, it is important to note that other health care providers—such as dentists, nurse practitioners, and physician assistants—are important providers of outpatient health care services in the United States. In 2014, these providers prescribed about 79 million courses of antibiotics, which represent almost 30 percent of the antibiotics prescribed in outpatient settings.<sup>\*</sup> Designing antibiotic stewardship interventions that address the inappropriate prescribing behavior of all types of health care providers will be critical to solving the challenge of antibiotic resistance.

---

\* Centers for Disease Control and Prevention, "Outpatient Antibiotic Prescriptions—United States, 2014," [https://www.cdc.gov/getsmart/community/pdfs/annual-reportsummary\\_2014.pdf](https://www.cdc.gov/getsmart/community/pdfs/annual-reportsummary_2014.pdf).

### Time constraints

In outpatient settings, doctors have limited time to see patients, diagnose their illnesses, and formulate a treatment plan. In interviews, physicians often say workload and time pressures contribute to the overprescription of antibiotics.<sup>9</sup> One study of Norwegian general practitioners found that busier physicians, those with more consultations, prescribed antibiotics at a higher rate than their less busy colleagues.<sup>10</sup> Interviews with

physicians suggest that they may quickly prescribe antibiotics because a shorter office visit allows them to see more patients or because they want to avoid lengthy explanations of why antibiotics are not needed.<sup>11</sup>

The process of repeatedly diagnosing and treating large numbers of patients may also affect a doctor's capacity to make sound, consistent prescribing decisions. A recent study analyzed how likely clinicians were to prescribe antibiotics for acute respiratory infections—conditions for which these drugs are only rarely recommended—depending on the time of day.<sup>12</sup> The findings showed that as their workday wore on, physicians were significantly more likely to prescribe antibiotics for these infections. The authors posited that “decision fatigue,” a decline in decision-making abilities after having to make repeated decisions, could be an explanation.<sup>13</sup>

---

“ A recent study ... showed that as their workday wore on, physicians were significantly more likely to prescribe antibiotics for [acute respiratory] infections. The authors posited that “decision fatigue,” a decline in decision-making abilities after having to make repeated decisions, could be an explanation.”

---

## Diagnostic uncertainty

Diagnostic uncertainty is another reason given for inappropriate prescriptions.<sup>14</sup> Patients with viral and bacterial infections often have similar symptoms—congestion, cough, sore throat—making it difficult for physicians to differentiate between the two.<sup>15</sup> For some conditions, a definitive diagnosis is difficult. It is not usually practical or desirable in an outpatient environment, for example, to collect the samples needed to diagnose whether a sinus infection is viral or bacterial because doing so would require an invasive procedure.<sup>16</sup>

Interviews with physicians demonstrate that when patients have these ambiguous symptoms, clinicians may nevertheless prescribe antibiotics immediately because they see it as the safe choice.<sup>17</sup> Physicians report being hesitant to let sick patients leave without treatment because they fear the condition could worsen, potentially exposing themselves to legal action.<sup>18</sup> One study found that many physicians perceive the risk of undertreating a patient to be greater than the risk from unnecessary antibiotic use.<sup>19</sup>

## Externalized responsibility

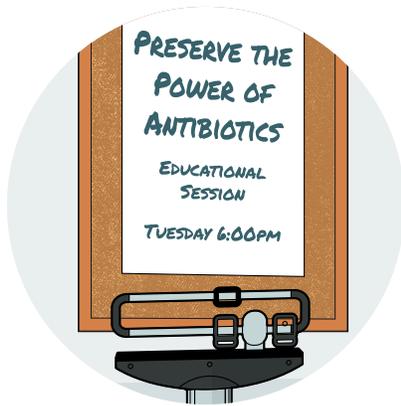
Given the volume of inappropriate antibiotic prescriptions and the ever-growing threat of antibiotic resistance, one might wonder why physicians do not simply examine and improve their prescribing. In some cases, they may not think that their individual practices, or those of peers in the same medical specialty, contribute significantly to the problem.

For example, in interviews with primary care pediatricians who participated in an antimicrobial stewardship intervention, all participants agreed that antibiotic overuse is a major problem.<sup>20</sup> However, the vast majority also felt it was not a significant problem among their specialty but rather was caused by practitioners in other areas of medicine. In another study with primary care clinicians, all participants interviewed agreed that antibiotics are not appropriate for treating acute bronchitis.<sup>21</sup> The physicians, aware that antibiotics are overprescribed for this condition, attributed the problem to other clinicians.

## Improving prescribing by understanding behavior

Central to designing effective antibiotic stewardship interventions is an understanding of the underlying factors that influence prescribing decisions. As highlighted above, a number of studies have focused on identifying the behavioral drivers of prescribing.

This knowledge base provides stakeholders with new insights to guide the development of antibiotic stewardship strategies that help doctors move closer to appropriate antibiotic use. Because it is difficult to change behavior, the approaches below may have a limited effect. However, they provide a valuable starting point for interventions that leverage social motivations to improve practice. Examples of common strategies include:



**Educational initiatives**, including both public awareness campaigns and professional learning opportunities, are potential ways to increase awareness of antibiotic overuse and help improve patient-physician communication. However, studies show that educational interventions may or may not have an effect on antibiotic prescribing.<sup>22</sup> While continued education on appropriate antibiotic use is important, general education or awareness efforts alone are unlikely to significantly reduce inappropriate use.



**Communications training** can help improve the dialogue between patients and physicians and reduce pressure on clinicians to inappropriately prescribe. Evidence shows that training in these skills—such as understanding patient concerns and communicating an agreed-upon treatment plan—can decrease unnecessary antibiotic prescribing.<sup>23</sup> One promising approach involves coaching physicians to suggest “positive,” nonantibiotic steps patients can take to feel better, such as home remedies to relieve symptoms.<sup>24</sup>



**Audit and feedback strategies** aim to make physicians more aware of their own prescribing habits. These programs review individual prescriber behavior and relay the findings back to physicians, often benchmarked against their peers or expected prescribing rates. Audit and feedback has been shown to improve antibiotic prescribing in some studies of outpatient settings,<sup>25</sup> but other studies have yielded mixed results.<sup>26</sup> Additionally, the impact of this type of intervention appears to last only as long as the intervention itself. One study found that once a successful audit and feedback program ended, antibiotic prescribing rates gradually returned to previous levels.<sup>27</sup>



**Clinical decision support systems** can guide prescribers through the process of evaluating patients and determining appropriate treatment plans consistent with current best practices. These systems, which can range from paper guidelines to computerized alerts, have been shown to be effective at improving antibiotic prescribing.<sup>28</sup>



**Delayed prescriptions** can help physicians manage situations in which they are uncertain about a patient's diagnosis but are afraid the condition may get worse. Using this approach, sometimes referred to as "watchful waiting," a physician writes an antibiotic prescription but advises the patient to fill it only if symptoms persist or worsen. A systematic review of the available evidence shows that this approach can reduce the number of antibiotic prescriptions filled, but the impact on patient satisfaction is unclear.<sup>29</sup>

## Using behavioral science to improve stewardship interventions

To have a greater impact on physician prescribing habits, researchers have begun integrating behavioral science techniques into stewardship strategies. These interventions attempt to target physicians' underlying social motivations in order to influence their decision-making through a technique known in the field of behavioral economics as "nudging."<sup>30</sup>

One recent intervention sought to reduce inappropriate antibiotic prescribing by appealing to physicians' desires to adhere to commitments they make publicly. Clinicians were asked to sign a letter explaining their pledge to follow guidelines for appropriate antibiotic prescribing and the reasons antibiotics are not always needed. The letters were enlarged and posted in each physician's office, where it would be easily visible to patients, alongside the provider's photograph. Physicians displaying these commitment posters were found to prescribe inappropriate antibiotics at a rate nearly 20 percent lower than those not participating in the poster intervention.<sup>31</sup> The researchers surmised that the physicians did not want to contradict their public commitment.

Another study explored how accountability and peer comparisons can motivate physicians to change their behavior by comparing two behavioral interventions with a conventional decision support strategy.<sup>32</sup> In one intervention, when physicians prescribed an antibiotic they were asked to provide a justification in the patient chart, visible to other physicians. In the second intervention, physicians were ranked by their level of inappropriate prescribing: Those with the least inappropriate prescribing were told they were "top performers," while their colleagues who wrote more inappropriate prescriptions were told they were not. Each of these

behavioral interventions led to significant reductions in inappropriate prescribing, whereas the conventional decision supports employed in the control arm did not. The authors posit that when physicians had to justify their prescriptions or were compared with peers, they were motivated to improve their prescribing behavior because they were concerned about their colleagues' opinions.

## Conclusion

Improving outpatient antibiotic prescribing practices is critical to minimizing the growing public health threat of antibiotic resistance. However, reducing inappropriate use is challenging. Health care stakeholders—including professional societies, health systems, and policymakers—can help build on the evidence base of why and how physicians make prescribing decisions to help design and implement more effective antibiotic stewardship programs in outpatient facilities.

## External reviewers

This brief benefited from the insights and expertise of external reviewers Julia Szymczak, assistant professor of epidemiology in the department of biostatistics, epidemiology, and informatics at the University of Pennsylvania; and Matthew Kronman, assistant professor of pediatrics in the division of pediatric infectious diseases at the University of Washington. Although they have reviewed the brief, neither they nor their organizations necessarily endorse its findings or conclusions.

## Acknowledgments

The project team—Kathy Talkington, David Hyun, Rachel Zetts, and Joe Thomas—would like to thank Heather Cable, Katie Portnoy, Kulsoom Jafri, Laurie Boeder, and Demetra Aposporos for providing valuable feedback on this brief.

## Endnotes

- 1 Katherine Fleming-Dutra et al., "Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits, 2010-2011," *Journal of the American Medical Association* 315, no. 17 (2016): 1864-73, <http://jamanetwork.com/journals/jama/fullarticle/2518263>.
- 2 Julia E. Szymczak et al., "Pediatrician Perceptions of an Outpatient Antimicrobial Stewardship Intervention," *Infection Control and Hospital Epidemiology* 35, no. S3 (2014): S69-78, <http://www.jstor.org/stable/10.1086/677826>; Petur Petursson, "GPs' Reasons for 'Non-Pharmacological' Prescribing of Antibiotics: A Phenomenological Study," *Scandinavian Journal of Primary Health Care* 23, no. 2 (2005): 120-25; Charlesnika T. Evans et al., "Providers' Beliefs and Behaviors Regarding Antibiotic Prescribing and Antibiotic Resistance in Persons With Spinal Cord Injury or Disorder," *Journal of Spinal Cord Medicine* 34, no. 1 (2011): 16-21; Patrick P. Dempsey et al., "Primary Care Clinicians' Perceptions About Antibiotic Prescribing for Acute Bronchitis: A Qualitative Study," *BMC Family Practice* 15, no. 1 (2014): 1; Christopher C. Butler et al., "Understanding the Culture of Prescribing: Qualitative Study of General Practitioners' and Patients' Perceptions of Antibiotics for Sore Throats," *BMJ* 317, no. 7159 (1998): 637-42, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC28658>; Guillermo V. Sanchez et al., "Effects of Knowledge, Attitudes, and Practices of Primary Care Providers on Antibiotic Selection, United States," *Emerging Infectious Diseases* 20, no. 12 (2014): 2041-47; Larissa May et al., "Multisite Exploration of Clinical Decision Making for Antibiotic Use by Emergency Medicine Providers Using Quantitative and Qualitative Methods," *Infection Control and Hospital Epidemiology* 35, no. 9 (2014): 1114-25; Howard Bauchner, Stephen I. Pelton, and Jerome O. Klein, "Parents, Physicians, and Antibiotic Use," *Pediatrics* 103, no. 2 (1999): 395-401.
- 3 Eefje G.P.M. de Bont et al., "Childhood Fever: A Qualitative Study on GPs' Experiences During Out-of-Hours Care," *Family Practice* 32, no. 4 (2015): 449-55; Jochen W.L. Cals et al., "Public Beliefs on Antibiotics and Respiratory Tract Infections: An Internet-Based Questionnaire Study," *British Journal of General Practice* 57, no. 545 (2007): 942-47.
- 4 Szymczak et al., "Pediatrician Perceptions"; Petursson et al., "GPs' Reasons."

- 5 Rita Mangione-Smith et al., "The Relationship Between Perceived Parental Expectations and Pediatrician Antimicrobial Prescribing Behavior," *Pediatrics* 103, no. 4 (1999): 711-18.
- 6 Butler et al., "Understanding the Culture"; Antonio T. Rodrigues et al., "Understanding Physician Antibiotic Prescribing Behaviour: A Systematic Review of Qualitative Studies," *International Journal of Antimicrobial Agents* 41, no. 3 (2013): 203-12; Dempsey et al., "Primary Care Clinicians' Perceptions"; Szymczak et al., "Pediatrician Perceptions"; Sharon A. Simpson, Fiona Wood, and Christopher C. Butler, "General Practitioners' Perceptions of Antimicrobial Resistance: A Qualitative Study," *Journal of Antimicrobial Chemotherapy* 59, no. 2 (2007): 292-96; May et al., "Multisite Exploration."
- 7 Sanchez et al., "Effects of Knowledge, Attitudes"; de Bont et al., "Childhood Fever."
- 8 Butler et al., "Understanding the Culture"; Petursson et al., "GPs' Reasons."
- 9 Butler et al., "Understanding the Culture"; Szymczak et al., "Pediatrician Perceptions"; Petursson et al., "GPs' Reasons"; de Bont et al., "Childhood Fever."
- 10 Svein Gjelstad et al., "Do General Practitioners' Consultation Rates Influence Their Prescribing Patterns of Antibiotics for Acute Respiratory Tract Infections?" *Journal of Antimicrobial Chemotherapy* 66, no. 10 (2011): 2425-33.
- 11 De Bont et al., "Childhood Fever"; Dempsey et al., "Primary Care Clinicians' Perceptions."
- 12 Jeffrey A. Linder et al., "Time of Day and the Decision to Prescribe Antibiotics," *JAMA Internal Medicine* 174, no. 12 (2014): 2029-31.
- 13 Ibid.
- 14 Rodrigues et al., "Understanding Physician Antibiotic Prescribing"; Dempsey et al., "Primary Care Clinicians' Perceptions"; Juan M. Vazquez-Lago et al., "Attitudes of Primary Care Physicians to the Prescribing of Antibiotics and Antimicrobial Resistance: A Qualitative Study From Spain," *Family Practice* 29, no. 3 (2011): <https://academic.oup.com/fampra/article-lookup/doi/10.1093/fampra/cmr084>.
- 15 Anthony W. Chow et al., "IDSA Clinical Practice Guideline for Acute Bacterial Rhinosinusitis in Children and Adults," *Clinical Infectious Diseases* 54, no. 8 (2012): <https://www.ncbi.nlm.nih.gov/pubmed/22438350>.
- 16 George H. Talbot et al., "Rigid Nasal Endoscopy Versus Sinus Puncture and Aspiration for Microbiologic Documentation of Acute Bacterial Maxillary Sinusitis," *Clinical Infectious Diseases* 33, no. 10 (2001): 1668-75, <http://dx.doi.org/10.1086/323813>.
- 17 Dempsey et al., "Primary Care Clinicians' Perceptions."
- 18 Butler et al., "Understanding the Culture"; Dempsey et al., "Primary Care Clinicians' Perceptions"; Simpson et al., "General Practitioners' Perceptions."
- 19 May et al., "Multisite Exploration."
- 20 Szymczak et al., "Pediatrician Perceptions."
- 21 Dempsey et al., "Primary Care Clinicians' Perceptions."
- 22 Dimitri Drekonja et al., "Antimicrobial Stewardship Programs in Outpatient Settings: A Systematic Review," Department of Veterans Affairs (2014), [https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0072334/pdf/PubMedHealth\\_PMH0072334.pdf](https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0072334/pdf/PubMedHealth_PMH0072334.pdf); Sumant R. Ranji et al., "Antibiotic Prescribing Behavior," in *Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies Technical Review*, ed. Kaveh G. Shojania et al. (Rockville, MD: Agency for Healthcare Research and Quality, 2006), 255-61.
- 23 Jochen W.L. Cals et al., "Enhanced Communication Skills and C-Reactive Protein Point-of-Care Testing for Respiratory Tract Infection: 3.5-Year Follow-Up of a Cluster Randomized Trial," *Annals of Family Medicine* 11, no. 2 (2013): 157-64; Attila Altiner et al., "Reducing Antibiotic Prescriptions for Acute Cough by Motivating GPs to Change Their Attitudes to Communication and Empowering Patients: A Cluster-Randomized Intervention Study," *Journal of Antimicrobial Chemotherapy* 60, no. 3 (2007): 638-44; Nick A. Francis et al., "Effect of Using an Interactive Booklet About Childhood Respiratory Tract Infections in Primary Care Consultations on Reconsulting and Antibiotic Prescribing: A Cluster Randomised Controlled Trial," *BMJ* 339 (2009): <http://www.bmj.com/content/339/bmj.b2885>; France Légaré et al., "Training Family Physicians in Shared Decision-Making to Reduce the Overuse of Antibiotics in Acute Respiratory Infections: A Cluster Randomized Trial," *Canadian Medical Association Journal* 184, no. 13 (2012): E726-34; Paul Little et al., "Effects of Internet-Based Training on Antibiotic Prescribing Rates for Acute Respiratory-Tract Infections: A Multinational, Cluster, Randomised, Factorial, Controlled Trial," *Lancet* 382, no. 9899 (2013): 1175-82.
- 24 Rita Mangione-Smith et al., "Communication Practices and Antibiotic Use for Acute Respiratory Tract Infections in Children," *Annals of Family Medicine* 13, no. 3 (2015): 221-27.
- 25 Jeffrey S. Gerber et al., "Effect of an Outpatient Antimicrobial Stewardship Intervention on Broad-Spectrum Antibiotic Prescribing by Primary Care Pediatricians: A Randomized Trial," *Journal of the American Medical Association* 309, no. 22 (2013): 2345-52.
- 26 Sumant R. Ranji et al., "Interventions to Reduce Unnecessary Antibiotic Prescribing: A Systematic Review and Quantitative Analysis," *Medical Care* 46, no. 8 (2008): 847-62; Drekonja et al., "Antimicrobial Stewardship Programs."

- 27 Jeffrey S. Gerber et al., "Durability of Benefits of an Outpatient Antimicrobial Stewardship Intervention After Discontinuation of Audit and Feedback," *Journal of the American Medical Association* 312, no. 23 (2014): 2569-70.
- 28 Drekonja et al., "Antimicrobial Stewardship Programs"; Ranji et al., "Antibiotic Prescribing Behavior"; Ralph Gonzales et al., "A Cluster Randomized Trial of Decision Support Strategies for Reducing Antibiotic Use in Acute Bronchitis," *JAMA Internal Medicine* 173, no. 4 (2013): 267-73.
- 29 Geoffrey K.P. Spurling et al., "Delayed Antibiotics for Respiratory Infections," Cochrane Database of Systematic Reviews (2013), <http://dx.doi.org/10.1002/14651858.CD004417.pub4>.
- 30 Daniella Meeker et al., "Nudging Guideline-Concordant Antibiotic Prescribing: A Randomized Clinical Trial," *JAMA Internal Medicine* 174, no. 3 (2014): 425-31; Daniella Meeker et al., "Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices: A Randomized Clinical Trial," *Journal of the American Medical Association*, 315, no. 6 (2016): 562-70; Richard H. Thaler and Cass R. Sunstein, *Nudge: Improving Decisions About Health, Wealth, and Happiness* (New York: Penguin Books, 2009).
- 31 Meeker et al., "Nudging Guideline-Concordant Antibiotic Prescribing."
- 32 Meeker et al., "Effect of Behavioral Interventions."

---

*This issue brief was updated in December 2017 to correct what the evidence shows regarding the effects of communications training.*

---

**For further information, please visit:**  
[saveantibiotics.org](http://saveantibiotics.org)

---

**Contact:** Heather Cable, manager, communications  
**Email:** [hcable@pewtrusts.org](mailto:hcable@pewtrusts.org)  
**Phone:** 202-552-2059

---

**The Pew Charitable Trusts** is driven by the power of knowledge to solve today's most challenging problems. Pew applies a rigorous, analytical approach to improve public policy, inform the public, and invigorate civic life.