

# Health-care providers a major contributor to problem of antibiotic overuse

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10 percent of health care providers write an antibiotic prescription for nearly every patient (95 percent or more) who walks in with a cold, bronchitis or other acute respiratory infection (ARI), according to a new Centers for Disease Control and Prevention-supported study published in the *Annals of Internal Medicine* and led by the Veterans Affairs Salt Lake City Health Care System and the University of Utah. The figure is at one end of a spectrum showing the remarkable variation in how providers use antibiotics. At the low end, 10 percent of providers prescribe antibiotics during 40 percent or fewer patient visits.

The study suggests that differences in the routines of individual providers drives variation in [antibiotic prescribing](#), more than differences in patient characteristics, standards of practice at different hospitals, or clinical settings (emergency department, primary care, urgent care). The report is an important step toward understanding the problem of antibiotic overuse, a major public health concern given the rise in antibiotic-resistant "superbugs".

"We were able to see that even if Dr. A works just down the hall from Dr. B they may practice medicine very differently," says Barbara Jones, M.D., M.S., assistant professor of internal medicine at the University of Utah and clinician at the VA Salt Lake City Health Care System. "We all receive similar training, but we can practice differently. The extent of this variation has been hard to measure in the past."

The high proportion of antibiotic prescribing for ARIs is not a

new problem, and the study found that 68 percent of all visits for ARI resulted in an antibiotic prescription, similar to other systems in the U.S. besides the VA. However, the ability to precisely describe the practice patterns of individual [health care providers](#) is relatively new, made possible by applying advanced statistical analysis to big data housed within the VA electronic health record. The researchers analyzed 1,044,523 patient visits for ARIs at 990 clinics or emergency departments at 130 VA medical centers (VAMCs) across the U.S. from 2005 to 2012. The overall proportion of visits in which providers prescribed [antibiotics](#) increased by two percent during the eight-year period. There was also a 10 percent increase in the proportion of broad-spectrum antibiotics (macrolides) prescribed despite the fact that guidelines recommend against them as a first line of defense for most respiratory infections.

An analysis of 480,875 visits and 2,594 providers who treated at least 100 patients for ARI showed that 59 percent of the variation in how often antibiotics were prescribed was attributed to the habits of individual providers. By comparison, 28 percent of the variation was related to differences in practice among clinics, and 13 percent to differences in practice among hospital centers. The prescribing patterns of individual providers existed after accounting for patient characteristics such as age, sex, and other illnesses.

"One of the things that makes this work stand out is that we could discern three levels of variation in antibiotic prescribing - by provider, clinic, and VA medical center - in a large data set," says author Tom Greene, Ph.D., director of population health at the Utah Center for Clinical and Translational Science. "This showed us the most striking result in this study, that the variation of prescribing practices between providers was quite large after accounting for patient characteristics."

The study suggests that understanding and improving provider decision-

making surrounding antibiotic use is a key element to reducing [antibiotic overuse](#) in the future. "We'd like to use this research to start a conversation among providers and patients about antibiotic prescribing for ARIs, and share the approaches of providers who are prescribing antibiotics less frequently with those who may be prescribing too often," adds Jones.

These conversations are difficult for providers to have face-to-face, but the electronic health record offers a new opportunity to connect providers, patients, and scientific evidence. "Our current focus is on implementation of tools to support decision-making and to enhance provider-patient communication," says senior author Matthew Samore, M.D., professor of [internal medicine](#) at the U of U and director of the Informatics, Decision Enhancement, and Analytic Sciences (IDEAS) Center at the Salt Lake City VA. "There is an opportunity to have a big impact with antibiotic stewardship."

**More information:** "Variation in Outpatient Antibiotic Prescribing for Acute Respiratory Infections in the Veteran Population" by Barbara Ellen Jones, MD, MSc; Brian Sauer, PhD; Makoto M. Jones, MD, MSc; Jose Campo, MD; Kavitha Damal, PhD, CCRC; Tao He, MS; Jian Ying, PhD, MStat; Tom Greene, PhD; Matthew Bidwell Goetz, MD; Melinda M. Neuhauser, PharmD, MPH; Lauri A. Hicks, DO; and Matthew H. Samore, MD, *Annals of Internal Medicine* July 21, 2015.

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