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Why Antibiotic Overuse Leading to Resistance Needs to be Addressed — and How It can be Done

Larissa May, University of California-Davis

Antibiotic resistance is a growing public health crisis that needs to be addressed quickly. The Centers for Disease Control and Prevention recently estimated that antibiotic resistant infections cause over 23,000 deaths each year in the United States — and globally the problem is much larger. In such infections, bacteria that are exposed to antibiotic medicines — but are not completely eliminated by those medicines — can develop immunity to the antibiotics and then resist treatment later on. When this happens, lives are lost. My research indicates that improving and expanding antibiotic stewardship programs could help address these growing problems — because antibiotic resistant infections are hastened when antibiotics are indiscriminately prescribed to treat conditions like common colds for which they are not relevant.

Over-Prescribing and Its Consequences

Antibiotics are life-saving medications that are vital to the treatment of severe infections. However, antibiotics often have negative side effects and the looming public health crisis of antibiotic resistant infections is hastened when they are used inappropriately.

To prevent one case of pneumonia with antibiotics, for example, physicians must treat 4,000 patients with a cold — even though roughly one out of every 20 patients prescribed antibiotics experience some kind of adverse reaction. While many of these adverse reactions are mild, ranging from minor diarrhea and nausea to rashes, in about one percent of cases these reactions lead to severe *C. difficile colitis* — a life-threatening colon infection caused by an overgrowth of bacteria in the gut. This entirely preventable infection has a 20-30 percent rate of relapse, often requiring multiple therapies including fecal transplantation.

Unfortunately, individual patient-physician decisions are not always swayed by the knowledge that antibiotics do not treat viruses or the knowledge that overprescribing will create major public health problems down the line. Healthcare professionals have been taught to do no harm, and yet, many underestimate the potential negative effects of antibiotics and figure these risks do not outweigh the need to treat the patient immediately. In turn, many patients feel that an antibiotic prescription is a requisite part of going to the doctor. And because physicians are increasingly judged and compensated based on patient satisfaction, they often feel pressured to prescribe antibiotics even when these medicines are not likely to work.

Given the likelihood of adverse effects and the mounting risk of mass antibiotic immunity, it is clear that, over time, many patients are the losers — even though individual patients demand these medications while looking for a quick fix.

Championing Antibiotic Stewardship

Despite pressures toward over-prescription of antibiotics, the landscape is far from hopeless. Evidence suggests that simple interventions can change incentives and encourage physicians to do the right thing for patients. Possible interventions include education programs for patients and physicians, standard guidelines for all health care institutions, and peer program that offer regular feedback to physicians. These simple interventions can improve the quality of care, patient outcomes, and ultimately reduce costs.

Because hospitals are now mandated to have antibiotic stewardship programs, reducing antibiotic misuse can be made more effective by targeting outpatient settings such as clinics, urgent care centers, and emergency departments for discharged patients. Up to half of misuse of antibiotics happens in these settings, mainly when providers inappropriately prescribe antibiotics for viral infections such as chest colds and the common

cold. These facilities must be held to the same standards as hospitals. Policymakers have an opportunity to craft and pass life-saving legislation that requires all health care sites follow the same antibiotic prescription guidelines as hospitals and keep careful tabs on prescriptions.

Patients must also be educated on the risks of antibiotics, so they understand why it can be in their own best interest to be treated without antibiotics. For example, certain viral ailments must simply run their course. A national campaign to educate the public about the dangers of inappropriate antibiotic use would be helpful but will take significant investment. In the meantime, there are simple and effective strategies physicians can deploy like offering positive, non-antibiotic recommendations to address patient expectations. This can happen without hurting physician satisfaction scores.

Some lessons may be gleaned from the increasing awareness of the opioid epidemic. As opioid deaths have become highly publicized, many physicians are more reluctant to give in to patients' demands for opiates. A similar understanding needs to develop around educating people about the use and misuse of antibiotics. Experience shows that "just say no" campaigns are ineffective. Instead, health leaders must educate communities about what works and what does not to improve care, even as they reform institutional incentives to encourage optimal effective care and discourage harmful measures like automatic antibiotic prescriptions.

Ways Forward

Health systems need additional incentives to invest in proper antibiotic stewardship. Fortunately, evidence shows that reforms are possible. Public health officials, pharmacists, and physicians are banding together in California and nation-wide to implement evidence-based practices in emergency departments and urgent care settings. Organizations interested in facilitating community stewardship programs should receive technical assistance and leadership support. In many settings, providers and patients must be taught about the potential harms of antibiotic over-prescription.

Institutions can build upon legislation enacted in California and other states mandating antibiotic stewardship programs in hospitals, long-term care facilities, and promoting appropriate antibiotic use in community clinics. This legislation is a good start, and can serve as a foundation for additional innovative programs to bring about a nationwide sea change in the use of antibiotics.

Read more in Larissa May, Katherine E. Fleming Dutra, Adam L. Hersh, and Daniel J. Shapiro, "Prevalence of Inappropriate Antibiotic Prescriptions among US Ambulatory Care Visits, 2010-2011" *Journal of the American Medical Association* 315, no. 17 (2016): 1864-1873.