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Antibiotic Judo Working Gently With Prescriber Psychology to Overcome Inappropriate Use

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Within the past year, the US Centers for Disease Control and Prevention (CDC), the European CDC, the World Health Organization, and the World Economic Forum all have released reports raising alarm over the ongoing global crisis of antibiotic-resistant infections. Resistance to our most powerful antibiotics continues to grow worse, and the pipeline of new antibiotics remains on life support.¹ Something has to give.

Antibiotics have a critical characteristic that makes them unique among all drugs and indeed all medical interventions: they suffer from transmissible loss of efficacy over time due to the spread of resistance. Every individual's use of antibiotics contributes to loss of their efficacy over time for everyone else. Effective antibiotics are thus a community property or trust, and abuse of antibiotics is an example of the *tragedy of the commons*: when one person takes an antibiotic for an infection that is probably viral, with a small possibility that it is bacterial, there may be a small potential benefit to that person, balanced against a slight collective harm to society. When this happens frequently, the collective potential benefit to the users remains small, but harm to society grows. When it occurs hundreds of millions of times per year, as for antibiotic prescriptions for outpatients in the United States,² the aggregate harm to society is catastrophic. Since the tragedy of the commons results from inherent conflict between what is perceived by individuals to be best for themselves over the short term vs what is harmful to the collective group over the long term, combating the tragedy of the commons is difficult from a policy perspective.

Directly confronting physicians and patients to convince them to alter behavior that is perceived to be in their self-interest does not seem to address the psychological underpinnings that lead to inappropriate prescriptions. Indeed a recent meta-analysis of 39 studies found that direct educational approaches generally have not resulted in sustained reductions in antibiotic prescriptions.³ As a result, nearly 8 decades after Alexander Fleming

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warned the public that penicillin was being misused and deaths from resistant infections would result, up to 50% of antibiotic prescriptions in the United States continue to be unnecessary and/or inappropriate.^{4,5}

In 2011, the Infectious Diseases Society of America (IDSA) published a position paper⁶ resulting from a workshop on antibiotic resistance that was jointly sponsored by the IDSA, the US Food and Drug Administration, and the US National Institute of Allergy and Infectious Diseases. In discussing how we can transform antibiotic stewardship, the paper concluded that “few studies have defined the relative impact of...drivers of inappropriate antibiotic prescription, or have investigated how to positively intervene to improve such behaviors. Primary research...is needed to better understand effective interventions to prevent such prescriptions.”^{6(pS414)}

In the current issue of *JAMA Internal Medicine*, Meeker et al⁷ provide us with the results of just such disruptive research. The authors developed a novel intervention that was based on a sophisticated understanding of how to overcome the psychology that drives behavior linked to inappropriate antibiotic prescriptions. Rather than direct confrontation with the force of education or nagging, they sought a gentler “nudging” approach that worked harmoniously with the underlying psychology of both patient and clinician. Their nudge not to prescribe inappropriate antibiotics was based on the psychological principle of “public commitment.” The authors summarize previous research that indicates that public commitment can be an effective means to modulate human behavior. To implement their program, the investigators had outpatient clinicians sign a written commitment not to prescribe antibiotics for likely viral syndromes. The signed commitment was visibly posted so that both patient and clinician could see it in the examination room.

The impact of the intervention was modest, an approximately 20% reduction in antibiotic prescriptions over 3 months during influenza season compared with an active control group. Nevertheless, the results were significant, and the intervention was easy to implement. It required no complex algorithms, no special technology, and no infrastructure or enforcement. Furthermore, a similar reduction from a baseline of 258 million outpatient prescriptions per year in the United States² extrapolates to a potential avoidance of millions prescriptions per year if the results can be generalized. Thus, the potential return on investment from this easy, gentle approach is large.

Judo is a Japanese martial art that can be translated as “gentle way” and focuses on using an opponent’s force against itself rather than directly confronting it with opposing force. A common axiom in *Judo* is “maximum efficiency with minimum effort.” Meeker et al⁷ have created a clever *Judo*-like approach that works with patient and clinician psychology to reduce antibiotic prescriptions. Meaningful gains can be achieved with minimal effort and cost.

How sustainable and how generalizable to other practice settings this gentle nudge approach is cannot be determined from the study, and it merits additional investigation. Furthermore, even with the *Judo*-like nudge, the majority of the baseline antibiotic use did remain. Other novel approaches will be needed to further reduce antibiotic prescriptions. New approaches

may emerge from further primary research into understanding the psychology that underlies inappropriate prescriptions. We also need to push into the clinic use of rapid diagnostics that empower providers to withhold antibiotics for viral infections and give the correct antibiotic for bacterial infections.^{1,6} Finally, policies that align the economics of self-interest with societal need, such as publicly reporting antibiotic use with modification of reimbursement based on the volume of antibiotics used (bonuses for low use, penalties for high use) would likely lead to sustained decreases in prescriptions.¹

We all bear responsibility to protect the public resource of antibiotic efficacy. We do need to continue critical, traditional antibiotic stewardship efforts, including education, restrictions, de-escalation, electronic reminders, etc. But new ideas, such as the simple and gentle public commitment concept Meeker and colleagues⁷ have developed, are needed to work in concert with traditional approaches to help us change the future state of antibiotic resistance.

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References

1. Spellberg B, Bartlett JG, Gilbert DN. The future of antibiotics and resistance. *N Engl J Med.* 2013; 368(4):299–302. [PubMed: 23343059]
2. Hicks LA, Taylor TH Jr, Hunkler RJ. US outpatient antibiotic prescribing, 2010. *N Engl J Med.* 2013; 368(15):1461–1462. [PubMed: 23574140]
3. Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. *Cochrane Database Syst Rev.* 2005; (4):CD003539. [PubMed: 16235325]
4. Barnett ML, Linder JA. Antibiotic prescribing to adults with sore throat in the United States, 1997–2010. *JAMA Intern Med.* 2013;10.1001/jamainternmed.2013.11673
5. US Dept of Health and Human Services, Centers for Disease Control and Prevention. [Accessed November 16, 2013] Antibiotic-resistant threats in the United States. 2013. <http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf>
6. Spellberg B, Blaser M, Guidos RJ, et al. Infectious Diseases Society of America (IDSA). Combating antimicrobial resistance: policy recommendations to save lives. *Clin Infect Dis.* 2011; 52(S5 suppl 5):S397–S428. [PubMed: 21474585]
7. Meeker D, Knight TK, Friedberg MW, et al. Nudging guideline-concordant antibiotic prescribing: a randomized clinical trial [published online January 27, 2014]. *JAMA Intern Med.* 10.1001/jamainternmed.2013.14191