Decision-Making and the Barriers to Judicious Antibiotic Use

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Escalating antibiotic resistance is a “multinational public health crisis.”¹ As children are heavy consumers of antibiotics and serve as community reservoirs of resistant organisms, promoting judicious pediatric antibiotic use can have high impact.² Decreasing prescribing rates over the past decade have recently plateaued; young children still receive, on average, >1 antibiotic prescription per year, most for broad-spectrum drugs, with 25% of antibiotics prescribed for diagnoses for which antibiotics are unlikely to be of benefit.^{3,4}

These data seem to defy rational logic; why is this problem so recalcitrant? Vaz et al,⁵ in this issue of *Pediatrics*, address this important question by recognizing that antibiotic prescribing decisions take place within the context of the physician–patient relationship, where the perspectives of individual families and physicians often take precedence over potential future risks of resistance for society at large.

Classic decision theory and behavioral economics can help to explain how we make flawed choices. Vaz et al⁵ demonstrate that many parents have imperfect information; they are mistaken about the indications for antibiotic treatment and remain confused about the distinction between bacterial and viral infections. Although perceptions of Massachusetts parents do not necessarily generalize to other populations, and although expecting antibiotics is not the same thing as requesting and receiving them, parent expectations can influence injudicious prescribing.⁶ Some confusion may result from our own recommendations; although we advise parents that “green

colored mucus” does not require antibiotics,⁷ the American Academy of Pediatrics’ Clinical Practice Guidelines list persistent purulent rhinorrhea with fever as a diagnostic criterion for acute bacterial sinusitis.^{7,8} Although physicians understand the difference between green-tinged mucous of a resolving virus versus a purulent bacterial sinusitis, this distinction may not be as clear to parents. Similarly, to parents, “coughing that produces mucous” of viral bronchitis may be indistinguishable from the presentation of bacterial pneumonia. There is also a degree of diagnostic uncertainty underlying many diagnoses; this could help to explain why family physicians, who may have less experience with sick children, have higher antibiotic prescribing rates.³

Externalities exist when individual choices impose costs on others that the decision-maker ignores. In the current context, societal risks from future antibiotic resistance might receive little weight relative to perceived benefits for one’s child and family. Physicians and parents are aware that nonspecific respiratory infections can progress to ear infections or sinusitis. This may be particularly salient for working parents, especially those who are more financially vulnerable, for whom missing a work day may be a significant burden;⁹ in the study by Vaz et al, parents of children covered by Medicaid were especially likely to expect antibiotics, compared with commercially insured parents.⁵

The behavioral economists Richard Thaler and Cass Sunstein¹⁰ point out that unlike mythical beings called “Econs,” who always make: rational

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decisions on the basis of facts and probabilities, decisions made by real “Humans” are frequently influenced by systematic and predictable biases. Humans are especially likely to make poor decisions under conditions of uncertainty and high emotionality.¹⁰ Despite the triumph of modern immunizations, parents and physicians may still fear the risk of occult serious bacterial illness. As opposed to rational Econs, “Humans frequently overweight the probability of small risks, especially when the risks are highly salient.”¹¹

Given these widespread deficiencies Humans exhibit in decision-making, how can we further improve judicious prescribing? It is interesting that Vaz et al⁵ found that parents of children covered by Medicaid were more likely to expect antibiotics. Perhaps these parents do not communicate this expectation, or perhaps their physicians are less easily persuaded, but previous studies have revealed that children of color and those from socioeconomically disadvantaged backgrounds are less likely to receive antibiotics.^{12,13} It is important to ensure that future strategies to decrease unnecessary prescribing do not decrease prescribing that is medically indicated, and do not further widen treatment disparities.¹⁴

There are some potentially win-win strategies to decrease antibiotic use, with low risk for inflicting harm. Interventions to improve understanding and communication can be targeted to settings with the greatest prevalence of inappropriate use.¹⁵ Immunizations have had extraordinary impact in reducing the need for antibiotics¹⁶; wider use of influenza vaccine would prevent related secondary infections. Improved point-of-care rapid diagnostic tests could help target antibiotics to where they are most likely to be of benefit.¹⁷ And, because agricultural livestock production accounts for 80% of US antibiotic use, it is important to support efforts by

the US Food and Drug Administration to promote a phase-out of medically important antibiotics in food-producing animals.¹⁸

The inexorable march of antibiotic resistance is egalitarian in that its effects cut across all geographic and socioeconomic groups. Vaz et al⁵ remind us that effective interventions will need to address joint decision-making at the physician-patient level. We all stand to benefit from successful efforts to maximize the benefits of antibiotics, and minimize the potential harms associated with their indiscriminate use.

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