Breaking the Ambulatory Antibiotic Prescribing Cycle with All-Antibiotic Stewardship, Patient Stewardship, and Visit Stewardship

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Ambulatory antibiotic use begets antibiotic use, and ambulatory antibiotics account for 85% to 95% of human antibiotic use [1]. A host of mostly cross-sectional, patient-focused studies have found that patients who receive antibiotics tend to think antibiotics are effective for their illness [2, 3]. Patient belief in the effectiveness of antibiotics begets wanting antibiotics for a future illness [4, 5]. Wanting antibiotics for a future illness begets care-seeking, and care-seeking begets receiving antibiotics again [6–8]. The cycle repeats.

Clinicians blame patients for this cycle. Clinicians' most common rationale for prescribing inappropriate antibiotics is that patients expect antibiotics [9]. However, the minority of patients probably expect antibiotics, and clinicians are notably bad at predicting which patients want antibiotics [6, 8].

Clinicians also worry that patients who do not receive antibiotics will be less satisfied [10]. Some studies have found no

association between whether antibiotics are prescribed or denied and worse patient satisfaction [11–13]. Other studies, many recent, have found antibiotic prescribing to be associated with higher patient satisfaction, although some of the differences are slight [14–18].

PHYSICIAN BEHAVIOR DETERMINES PATIENT BEHAVIOR

Whether patients expect or are satisfied with antibiotics, physicians' underestimate how their own behavior predictably shapes future patient behavior. In a longitudinal study of opioid prescribing, Barnett and colleagues [19] found that compared to patients whose physicians prescribed low-intensity opioids at index emergency department visits, patients whose physicians prescribed high-intensity opioids were 30% more likely to be long-term opioid users. The near-random pairing of patients and emergency department physicians influenced patients' long-term probability of dangerous medication exposure.

In a new *Clinical Infectious Diseases* manuscript, many of these same investigators applied the same longitudinal, quasi-random method to examine patient visits to urgent care clinicians and antibiotic prescribing [20]. At index acute respiratory infection visits—although there were no differences in expected antibiotic receipt by patient characteristics—the lowest

quartile of antibiotic prescribers had an antibiotic prescribing rate of 42%, and the highest quartile of antibiotic prescribers had an antibiotic prescribing rate of 80%. In the year after the index visit, compared to patients who saw the lowest-quartile antibiotic prescribers, patients who saw the highest-quartile prescribers had 9% more acute respiratory infection visits, 15% more acute respiratory infection antibiotic fills, and significantly more antibiotic fills for any reason. The influence of physician prescribing even extended to the spouses of patients. Over the next year, compared to the spouses of those patients who saw the lowest-quartile antibiotic prescribers, the spouses of those patients who saw the highest-quartile antibiotic prescribers had similar increases in antibiotic fills. The investigators convincingly show that it was receipt of antibiotics at the index visit that led to subsequent care seeking and subsequent antibiotic receipt.

Initial, superficial reactions to the findings of Shi and colleagues [20] could lead one to focus on inappropriate antibiotic prescribing by high prescribers at acute respiratory infection visits. Indeed, ambulatory stewardship has focused on such prescribing. Clinician training and education; audits and feedback, especially targeting high-prescribing clinicians; electronic health record decision support; and in-visit nudges have been somewhat successful in reducing inappropriate

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antibiotic prescribing [21–24]. Recommendations, policies, and measures from the National Action Plan for Combating Antibiotic-Resistant Bacteria, the National Committee for Quality Assurance's Healthcare Effectiveness Data and Information Set, the Centers for Disease Control and Prevention, The Joint Commission, and Choosing Wisely all presume intervention on antibiotic prescriptions by prescribers at infection-related visits [25–29].

However, collectively, prescriber- and visit-focused interventions have resulted in modest improvements in antibiotic prescribing, and only among children [30]. A deeper dive into the data presented by Shi and colleagues [20] in the context of other research suggests 3 broader approaches to stewardship that could be important in improving ambulatory antibiotic stewardship and breaking the antibiotic prescribing cycle: all-antibiotic stewardship, patient stewardship, and visit stewardship.

ALL-ANTIBIOTIC STEWARDSHIP

Antibiotic prescribing measures that focus on specific diagnoses miss a large proportion of antibiotic prescribing. In the study by Shi and colleagues [20], looking across all locations, acute respiratory infections only accounted for about a quarter of all follow-up antibiotic prescribing. In the year after the index visit, the antibiotic prescribing rate for acute respiratory infections ranged from 20 to 24 prescriptions per 100 patients. All-antibiotic prescribing ranged from 93 to 105 prescriptions per 100 patients in the subsequent year.

My colleagues and I have found that 17% to 23% of ambulatory antibiotics are not associated with an antibiotic-appropriate diagnosis—and are often not even associated with an infection-related diagnosis—and 28% of ambulatory antibiotics are not associated with any diagnosis or even any visit [31, 32].

Beyond the reason for antibiotic prescribing, consideration should be given

to where ambulatory antibiotics are prescribed. We previously found that decreasing proportions of antibiotics are being prescribed in physician offices, urgent care centers, emergency departments, outpatient surgery centers, home visits, and retail clinics [32]. In the study by Shi and colleagues [20], patients made an index acute respiratory infection visit to an urgent care center. However, in the subsequent year, fewer than 20% of follow-up visits were to the same urgent care center. About 20% of subsequent acute respiratory infection visits were to a primary care physician, and a few percent were to a *different* urgent care center, emergency departments, retail clinics, or direct-to-consumer telemedicine companies. About 60% of follow-up acute respiratory infection visits were to other, undefined sites.

Narrowly focusing on antibiotic prescribing on 1 visit, 1 site, and 1 prescriber at a time promotes finger pointing. Primary care points the finger at urgent care. Urgent care points at the emergency department. Everyone points at direct-to-consumer telemedicine [33, 34]. All this finger pointing engenders a form of learned helplessness: clinicians figure patients are just going to get antibiotics from “somewhere else,” and so preemptively presume patients are there to get antibiotics and prescribe accordingly.

All-antibiotic stewardship is a solution to location-, visit-, and diagnosis-specific antibiotic prescribing. All-antibiotic stewardship would ideally be done regionally to encourage different types of practices to work together (eg, nearby primary and urgent care clinics), but could also be done by prescriber, clinic, health system, or payer. Beyond capturing all antibiotic prescriptions, all-antibiotic stewardship partially alleviates the need for all infections to be coded perfectly (though good coding is still an important goal) [35]. All-antibiotic stewardship avoids problems of gaming by diagnosis shifting, as seen in the article by Shi and colleagues [20], in which higher prescribers selected more “antibiotic appropriate” diagnoses

[36, 37]. All-antibiotic stewardship also avoids the problem of missing non-visit based antibiotic prescriptions [31, 32].

PATIENT STEWARDSHIP

Patient stewardship would focus interventions on patients themselves. The ambulatory antibiotic prescribing rate in the United States is about 830 prescriptions per 1000 people per year, but antibiotic use is not evenly distributed [38–40]. The patients in the study by Shi and colleagues [20] sought care at urgent care centers for respiratory symptoms and, ignoring the index antibiotic prescription, had a subsequent antibiotic use rate of about 1000 prescriptions per 1000 people per year. My colleagues and I previously found that 40% of health plan enrollees in a year received at least 1 antibiotic [32]. Half of those who filled 1 prescription filled 2 or more antibiotic prescriptions; 13% filled 4 or more prescriptions.

Even in the absence of a pandemic, everyone gets respiratory symptoms. Why is it that only a minority of patients seek care for them, and why do a small proportion of patients use so many courses of antibiotics for respiratory symptoms? Of course, some patients need multiple courses of antibiotics in a year, due to chronic infections, illness exacerbations, and immunosuppression. However, increasing our understanding of why some patients seek out antibiotics and then intervening with those patients has not been a part of ambulatory antibiotic stewardship.

Repeated antibiotic prescribing may be a result of thinking superficially about patients' problems and not addressing underlying concerns or medical problems. Receiving multiple courses of antibiotics per year could be a marker of patients with unaddressed medical problems, like allergies, asthma, chronic obstructive pulmonary disease, anatomic sinus disease, venous insufficiency, and urinary incontinence.

Patient stewardship programs might flag patients who receive 3 or more

antibiotic prescriptions in a year. Practices or payors could evaluate whether such individuals have a valid reason for receiving such antibiotics. For those that do not, the program would explore with patients their symptoms, concerns, expectations, and goals in seeking care and receiving treatment. A patient stewardship program would be evaluated on changes in antibiotic prescribing and, perhaps, patient experience.

VISIT STEWARDSHIP

In-person care is the default method of delivering care, but many in-person visits for respiratory symptoms are unnecessary. Many episodes of the common cold, acute bronchitis, sinusitis, and influenza could be cared for without an in-person visit, which would avoid wasted time by the clinician and patient and reduce the risk of unnecessary antibiotic prescriptions. The coronavirus disease 2019 pandemic has demonstrated some benefits of non-visit based care; patients might even get superior care without a visit if they receive longitudinal, daily monitoring [41]. In some respects, in-person visits for many respiratory symptoms could be viewed as a triage failure and the wasteful use of a precious resource.

A visit stewardship measure could be the proportion of all respiratory infection episodes that require an in-person visit. The denominator, calculated using electronic health records, would include all respiratory infection episodes cared for in-person and via telephone, remote monitoring, or asynchronous messaging. Coupled with an all-antibiotic stewardship measure, visit stewardship measures will demonstrate whether increasing remote care reduces antibiotic use.

CONCLUSION

Current ambulatory antibiotic stewardship measures and interventions focus late in the antibiotic prescribing process. Ambulatory stewardship implicitly seeks to affect the interaction between 1 patient and 1 clinician after the patient has

already gone to the trouble of deciding they need to seek care, selected a site of care, and made a visit. Measures have neither encouraged consideration of how patients think about obtaining care for their symptoms and how patients select a site of care, nor enabled practices to think creatively about better ways to deliver care for acute respiratory and other infections. Better ambulatory stewardship measures, including all-antibiotic, patient, and visit stewardship, have the potential to reduce unnecessary antibiotic use by intervening on many more points and breaking the ambulatory antibiotic prescribing cycle.

Note

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