Editorial Commentary

Modifying Antibiotic Prescribing in Primary Care

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(See the article by Rautakorpi et al. on pages 1221–30)

Enormous volumes of antibiotics are prescribed in the primary health care setting every day. Although much of this prescribing is appropriate, it is well recognized that inappropriate prescribing, especially for respiratory tract infections, is highly prevalent worldwide [1, 2]. Even well-justified antibiotic prescribing can result in unwanted patient outcomes via “collateral damage” to normal bacterial flora, leading to the advent of Clostridium difficile or antibiotic resistance among commensal organisms [3]. Such consequences are particularly tragic if they are severe and have occurred after inappropriate antibiotic use. This is particularly relevant in our current era of infections with strains of C. difficile with enhanced virulence [4]. It is also evident that widespread antibiotic use is driving the resistance to antibiotics of common, community-acquired pathogens such as Streptococcus pneumoniae, Streptococcus pyogenes, and Staphylococcus aureus, leading to significant changes in empirical treatment guidelines for many common infections in certain geographic areas [5, 6]. Other consequences include the potential for worsened clinical outcomes as a result of inactive empirical antibiotic therapy as well as increasing economic costs for the community. Data on the association between the appropriateness of empirical antibiotic therapy and patient outcomes is sparse for primary health care, compared with data from hospital settings, but anecdotal experience indicates that poor early antibiotic choice may be associated with progression of infection leading to hospitalization.

In view of the above concerns, it appears reasonable that efforts be expended to improve the adequacy of antibiotic prescribing in the primary care setting. In this issue of Clinical Infectious Diseases, Rautakorpi et al. [7] describe a remarkable effort to improve antibiotic use in the Finnish primary health care setting. It has long been known that antibiotic prescribing is taken seriously in Scandinavia; indeed, almost one-third of all primary health care centers in Finland expressed a willingness to participate in this study. A multifaceted intervention was initiated over a 2-year period, primarily targeting physicians, although the authors hint at enhanced education for patients. One physician from each participating health care center spent 6.5 days in a “train the trainer” program. Their primary goal was to improve compliance among their colleagues with antibiotic prescribing guidelines for 6 common infections—otitis media, sinusitis, pharyngitis, acute bronchitis, bacterial skin infections, and urinary tract infections. Feedback on the study results, which acted as an important stimulus for ongoing adherence, was given to the physicians once a year.

The intervention was successful on some, but not all, counts. There were significant improvements in compliance with first-line antibiotic treatment recommendations for sinusitis (from 35% to 51%; P < .001), acute bronchitis (from 4% to 9%; P = .015), and urinary tract infections (from 66% to 78%; P = .009). Such improvements were generally sustained at the post-intervention follow-up (2 years after intervention), except for acute bronchitis. There were also significant improvements in compliance with guidelines for the duration of antibiotic therapy for otitis media (from 2% to 21%; P < .001), sinusitis (from 32% to 46%; P < .001), and urinary tract infections (from 55% to 64%; P = .042), with sustained improvements for otitis media and sinusitis.

Although significant progress was achieved, the absolute targets reached after intervention are still not ideal, and like other similar studies [8], these data clearly illustrate the challenges faced by the health care community in curbing the inappropriate use of antibiotics. The unforeseen problems faced by the investigators with regard to implementation of the education may have reduced their ability to achieve maximum benefits, especially those that are sustained. Indeed, only 58% of physicians participating in the final data collection exercise had participated in the training program.
Of particular interest, compliance with guidelines by physicians in control health care centers, which did not participate in the “train the trainer” program, was not substantially different from that of physicians from study health care centers, which did participate in training. In our view, this does not substantially negate the results of the study. Explanations for this may include the nationwide exposure of the study and promotion of national treatment guidelines; a lack of information about baseline prescribing habits for the control health care centers to compare with their subsequent prescribing rates; and the “Hawthorne effect,” whereby compliance with guidelines occurred purely because physicians knew that their prescribing behavior was being observed.

Of major importance was that no improvement was observed in the number of patients receiving inappropriate antibiotics for unspecified upper respiratory tract infections, acute bronchitis, and viral pharyngitis. Despite clear guidelines of not prescribing antibiotics as first-line treatment for acute bronchitis [7], this constituted the majority of incorrect prescribing. Such habits are not unique to this study [9], and as the authors point out, it is far easier for interventions to change physician behavior regarding antibiotic choice and duration of treatment than to ensure that physicians refrain from antibiotic use altogether when significant bacterial infection is unlikely. Such a phenomenon is observed in all health care settings, whether it be intensive care units [10] or primary health care centers. In the United States, this scenario may be exacerbated by the common phenomenon of prescribing antibiotics over the telephone. In one recent observation, 44% of all antibiotics prescribed in primary care were unaccompanied by billing for an office visit, implying that the antibiotic prescription had been initiated as a result of a telephone call or consultation with a nurse, rather than a physician (D.P., unpublished data). Such activity is highly detrimental to the efforts against inappropriate prescribing.

Rautakorpi et al. [7] clearly demonstrate that changing physician prescribing behavior via a train-the-trainer intervention to improve adherence to guidelines is an endeavor that requires a substantial amount of time and resources. They vividly describe some of the “real-world” experiences that can disrupt such a program. Are there any alternative strategies that could be initiated?

From previous studies, it is evident that when patients expect antibiotics, it is more likely that antibiotics will be prescribed, and when physicians perceive that patients expect antibiotics, it is substantially more likely that antibiotics will be prescribed [11]. This illustrates the complex nature of antibiotic prescribing in the doctor-patient relationship and highlights the importance of a targeted intervention aimed at both physicians and patients. Although the authors mention production of posters and patient leaflets [7], it appears likely that this was something of a “passive” intervention. In contrast, several investigators have described more aggressive efforts to educate patients. Harris et al. [12] used posters in the examination room plus a brief, interactive computerized education module to reduce the proportion of patients with acute bronchitis who received antibiotics. Antibiotic use decreased from 58% to 24% as a result of the intervention. Gonzales et al. [13] used both mailed household educational materials, including refrigerator magnets and educational pamphlets, as well as office-based educational materials directed at patients during primary care consultations. A substantial decline in antibiotic prescriptions for acute bronchitis was observed (74% to 48%; \( P = .003 \)). Similar results have been reported among children with active parental education [14]. With regard to patient satisfaction, others showed that, despite a significant reduction in antibiotic prescriptions for respiratory tract symptoms after a multifaceted intervention, there was no deterioration in the degree of patient satisfaction [8]. A well-informed patient can redefine his or her expectations for antibiotics and often break the cycle of requesting antibiotics only because they were received previously.

In conclusion, Rautakorpi et al. [7] have added to the mounting literature regarding the effects of a detailed and multifaceted intervention in an attempt to alter antimicrobial prescribing practices. The primary aims of improving adherence to treatment guidelines were reached; unfortunately, overall antibiotic use was not reduced. This needs to be the primary goal not only of the Finnish health system but also of health systems worldwide. The data from this and other studies [1, 8] clearly indicate that antibiotic prescribing practices for primary health care should be a priority for government and policy makers. The ideal intervention method is still not defined, and further research should endeavor to clarify this, particularly with regard to sustainability, cost-effectiveness, potential adverse outcomes of not prescribing antibiotics, and facilitation of the doctor-patient relationship. Without such efforts, problems such as antibiotic-resistant strains of \( C. \) difficile and other community-acquired pathogens will only continue to worsen.

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