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Improving Prescribing of Antibiotics in Long-term Care: Comment on "Prolonged Antibiotic Treatment in Long-term Care"

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- spectrum antibiotic use among intensive care unit patients: a controlled interrupted time series analysis. *Infect Control Hosp Epidemiol.* 2012;33(4):354-361.
22. Solomon DH, Van Houten L, Glynn RJ, et al. Academic detailing to improve use of broad-spectrum antibiotics at an academic medical center. *Arch Intern Med.* 2001;161(15):1897-1902.
 23. Rochon PA, Tu JV, Anderson GM, et al. Rate of heart failure and 1-year survival for older people receiving low-dose beta-blocker therapy after myocardial infarction. *Lancet.* 2000;356(9230):639-644.
 24. Rochon PA, Stukel TA, Bronskill SE, et al. Variation in nursing home antipsychotic prescribing rates. *Arch Intern Med.* 2007;167(7):676-683.
 25. Mor V. A comprehensive clinical assessment tool to inform policy and practice: applications of the minimum data set. *Med Care.* 2004;42(4)(suppl):III50-III59.
 26. Levy AR, O'Brien BJ, Sellors C, Grootendorst P, Willison D. Coding accuracy of administrative drug claims in the Ontario Drug Benefit database. *Can J Clin Pharmacol.* 2003;10(2):67-71.
 27. Spiegelhalter DJ. Funnel plots for comparing institutional performance. *Stat Med.* 2005;24(8):1185-1202.
 28. Hellerstein JK. The importance of the physician in the generic versus trade-name prescription decision. *Rand J Econ.* 1998;29(1):108-136.
 29. De Sutter AI, De Meyere MJ, De Maeseeneer JM, Peersman WP. Antibiotic prescribing in acute infections of the nose or sinuses: a matter of personal habit? *Fam Pract.* 2001;18(2):209-213.
 30. Durbin WA Jr, Lapidus B, Goldmann DA. Improved antibiotic usage following introduction of a novel prescription system. *JAMA.* 1981;246(16):1796-1800.
 31. Echols RM, Kowalsky SF. The use of an antibiotic order form for antibiotic utilization review: influence on physicians' prescribing patterns. *J Infect Dis.* 1984;150(6):803-807.

INVITED COMMENTARY

Improving Prescribing of Antibiotics in Long-term Care

Resistant to Change?

Prescribing for older people in the long-term care environment is particularly challenging. Residents are usually frail and have multiple comorbidities and limited life expectancy. However, the literature is replete with examples of inappropriate prescribing, including polypharmacy and undertreatment. Furthermore, medication review is not adequately implemented, resulting in medicines being used for longer than required. This is a particular problem with antibiotic prescribing because continued use may lead to the development of antimicrobial resistance.

This latter point is reinforced by the findings presented by Daneman et al¹ in this issue of *JAMA Internal Medicine*, which add to the growing body of evidence highlighting the major problem of excessive antibiotic prescribing in long-term care for older people. Their previous publication² revealed prevalent prescribing of antibiotics, variability across long-term care facilities, and use beyond recommended duration. In the present study, a large administrative database was used to retrospectively examine antibiotic prescribing in approximately 67 000 residents (median age, 86 years) of long-term care facilities. During the study year, 50 061 residents (74.8%) received an incident antibiotic course, with 44.9% of courses exceeding 7 days. Although more than 2600 prescribers issued prescriptions for antibiotics, 20% of prescribers were responsible for 79.6% of long-term prescriptions (defined as >7 days). Daneman et al¹ also calculated that if long- and average-duration prescribers adopted the profile of short-duration prescribers, the total antibiotic days would decrease by 35% and 17%, respectively. These striking findings clearly reveal high rates of institutional antibiotic use for prolonged periods.

Although the authors acknowledge that there were no data on what infections were being treated, on the basis of the antibiotics prescribed and findings from previous studies, it was evident that most were prescribed for urinary tract, respiratory tract, or skin and soft tissue infections. Second- and third-generation fluoroquinolones accounted for 35% of antibiotics prescribed. This is in marked

contrast to recently published data from long-term care facilities in Europe and the United Kingdom. McClean et al³ reported that co-amoxiclav and trimethoprim were the most frequently prescribed antibiotics in nursing homes in 17 European countries. The level of fluoroquinolone prescribing is surprising given the association between the use of these antibiotics and *Clostridium difficile* infection. Boone et al⁴ compared prevalence rates for toxigenic *C difficile* in samples obtained from inpatients, outpatients, and nursing residents in a health care system in Virginia and found the highest rates in nursing home residents. Clearly, greater caution should be exercised in the use of fluoroquinolones in the long-term care setting.

There are a number of limitations to the study. For example, the authors have not examined prescribing of topical products that have been shown to be extensively prescribed in the residential care setting.⁵ There is also no information available as to the prescribers' rationale for antibiotic selection and duration of treatment and whether these decisions were based on culture and sensitivity test results. We recognize that the long-term care environment is a complex setting that does not lend itself to efficient and accurate diagnosis of infection and subsequent sensitivity testing of infecting pathogens. Therefore, antibiotics are frequently prescribed empirically, without examination of the resident. Furthermore, no data are presented indicating that shorter courses of antibiotics were as effective as longer treatment courses, although most evidence would suggest this to be the case.

Previous research has shown that in the long-term care environment, nursing staff were the driving force behind antibiotic prescribing.⁶ In the case of urinary tract infections, physicians reported that they accepted the nursing staff's assessment of the resident and seldom visited a patient in a nursing home to confirm diagnosis. Family pressure also resulted in antibiotic prescribing. This study did not have access to these kinds of data, but understanding the motivation behind this decision making is essential if we are to overcome the public health threat of resistance.

The terms *therapeutic momentum* and *therapeutic inertia* have been coined to describe the problems that may arise in prescribing for older people.⁷ Therapeutic momentum is when more drugs are added in response to new but questionable indications, whereas therapeutic inertia results from drugs being prescribed in the absence of periodic review of net benefit. Elements of momentum and inertia may encompass aspects of the prescribing of antibiotics, such as responding to the appearance of nonspecific symptoms via the prescribing of antibiotics for longer than necessary. To overcome momentum and inertia, consideration has to be given to prescriber preference and treatment duration as advocated by Daneman and colleagues.¹

We support this approach as do systematic reviews of the literature that have summarized evidence on how to improve antibiotic prescribing practices in a variety of settings, such as ambulatory care and in hospitals.⁸ Interventions that appeared to be effective in ambulatory care were multifaceted in nature, combining physician, patient, and public education, and led to changes in antibiotic choice and duration of use. However, Arnold and Straus⁸ noted that “the most effective intervention to improve the prescribing of antibiotics appears to be condition- and situation-specific” and they recognized that local barriers to change needed to be identified and addressed. We have found this in work undertaken on infection control within the long-term care setting in which issues beyond the influence of nursing home staff (eg, finances, regulation, or management priorities) affected their ability to implement an intervention.⁹ The complexity of the long-term care environment has already been alluded to, and this needs to be accounted for when developing and implementing interventions that seek to change behavior, such as prescribing. Any intervention needs to address the nurse-physician-family triad because this appears to be influential in generating antibiotic prescriptions in this setting. Interestingly, to our knowledge, there has been no systematic synthesis of evidence specific to interventions targeted at antibiotic prescribing in the long-term care environment. Such a review of evidence may go some way to identifying what may be effective and highlighting any gaps that have not been addressed by research to date.

This long-term care environment has been described as a reservoir for multidrug-resistant organisms including methicillin-resistant *Staphylococcus aureus*,¹⁰ which may spread owing to the frequent hospitalizations observed with a population of old, frail residents. Daneman and colleagues¹ have confirmed that antibiotic prescribing in this setting remains a major challenge, and efforts should focus on the development and implementation of strategies that will constrain unnecessary and prolonged antibiotic prescribing.

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1. Daneman N, Gruneir A, Bronskill SE, et al. Prolonged antibiotic treatment in long-term care: role of the prescriber [published online March 18, 2013]. *JAMA Intern Med.* 2013;173(8):673-682.
2. Daneman N, Gruneir A, Newman A, et al. Antibiotic use in long-term care facilities. *J Antimicrob Chemother.* 2011;66(12):2856-2863.
3. McClean P, Hughes C, Tunney M, Goossens H, Jans B; European Surveillance of Antimicrobial Consumption (ESAC) Nursing Home Project Group. Antimicrobial prescribing in European nursing homes. *J Antimicrob Chemother.* 2011;66(7):1609-1616.
4. Boone JH, Goodykoontz M, Rhodes SJ, et al. *Clostridium difficile* prevalence rates in a large healthcare system stratified according to patient population, age, gender, and specimen consistency. *Eur J Clin Microbiol Infect Dis.* 2012; 31(7):1551-1559.
5. McClean P, Tunney M, Gilpin D, Parsons C, Hughes C. Antimicrobial prescribing in residential homes. *J Antimicrob Chemother.* 2012;67(7):1781-1790.
6. Schweizer AK, Hughes CM, Macauley DC, O'Neill C. Managing urinary tract infections in nursing homes: a qualitative assessment. *Pharm World Sci.* 2005; 27(3):159-165.
7. Gurwitz JH. The physics of geriatric pharmacotherapy: overcoming therapeutic inertia and momentum. *Am J Med.* 2012;125(6):523-524.
8. Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. *Cochrane Database Syst Rev.* 2005;4(4):CD003539. doi:10.1002/14651858.CD003539.pub2.
9. McClean P, Tunney M, Parsons C, Gilpin D, Baldwin N, Hughes C. Infection control and methicillin-resistant *Staphylococcus aureus* decolonization: the perspective of nursing home staff. *J Hosp Infect.* 2012;81(4):264-269.
10. Baldwin NS, Gilpin DF, Hughes CM, et al. Prevalence of methicillin-resistant *Staphylococcus aureus* colonization in residents and staff in nursing homes in Northern Ireland. *J Am Geriatr Soc.* 2009;57(4):620-626.

EDITOR'S NOTE

The Problem of Polypharmacy for Nursing Home Residents

Inappropriate prescribing and overuse of antibiotics is a chronic and growing problem. We know that polypharmacy is a problem for older patients. In this issue of *JAMA Internal Medicine*, Daneman et al show that many nursing home residents receive an overly long course of antibiotics, mostly related to provider characteristics. Because there is no known benefit to longer (>7

days) courses of antibiotics and multiple harms, including rashes, antibiotic resistance, and increased frequency of *Clostridium difficile* infection, this article earns a Less Is More designation.

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