

## Optimizing Antimicrobial Use in Nursing Homes: No Longer Optional

Empirical and often inappropriate antimicrobial usage is extensive in all settings, but particularly in nursing homes (NHs).<sup>1</sup> Frequently, a clinical course of antibiotics is initiated without an adequate clinical evaluation. For example, up to one-third of prescriptions for suspected urinary tract infection in NH residents are for asymptomatic patients who are bacteriuric.<sup>2</sup> Inappropriate antibiotic usage also results from errors in drug choice, the duration or dosage of antibiotics, and the lack of appropriate laboratory testing.

Unnecessary and inappropriate use of antimicrobials, like other systemic drugs, has dire consequences such as drug interactions, adverse drug events, development of antimicrobial resistance, and excess costs.<sup>1,3-5</sup> Although appropriate antimicrobial usage is desired, its application in NHs is challenging, predominantly as a consequence of delay in diagnosis due to the absence of on-site physicians, lack of clinical findings in older adults, presentation of infection with generalized systemic symptoms (such as confusion and falls) rather than infection-specific presentation, and lack of on-site diagnostics.<sup>1</sup>

Several strategies have been studied or proposed to reduce inappropriate antimicrobial practices in NHs. These include antimicrobial use review by the infection control committee to monitor antibiotics prescribed in the NH; development and promotion of programs to optimize judicious antibiotic use; and as-needed audits to assess antibiotic appropriateness, prevalence of antibiotic resistance, and antibiotic-related adverse events.<sup>1,6</sup> A recent study in multiple NHs in the United States and Canada evaluated the effectiveness of a more-proactive approach to minimizing inappropriate antimicrobial practices.<sup>7</sup> This study advocated the use of clinical algorithms targeted to physicians and nurses and implementing a multicomponent program of education, written material, real-time reminders, and outreach visits to reduce urinary tract infections in NHs. The authors showed a 31% reduction in antimicrobial use for urinary tract infections, although they did not show a reduction in overall antimicrobial use. In another randomized study in 20 NHs in the United States, a multicomponent educational intervention focusing on NH-acquired pneumonia led to a significant improvement in guideline adherence, but the study did not show a change in the use of oral antibiotics.<sup>8</sup>

This issue of the *Journal of the American Geriatrics Society (JAGS)* contains two articles that evaluate the effect of educational interventions to optimize overall antimicrobial prescribing for common infections in NHs.<sup>9,10</sup> The first study, by Monette et al., was conducted in eight public NHs in Ontario, Canada.<sup>9</sup> Their goal was to propose a realistic educational intervention to optimize antibiotic prescribing practices for a variety of infections, including urinary tract infections, skin and soft tissue infections, and pneumonia. Because a facility-wide intervention was used, cluster randomization design was employed to reduce the risk of contamination between study and control units. With the assistance of each facility pharmacist, they developed an antibiotic guide listing common infections; recommended empirical antibiotics; and the dosage, frequency, and duration of treatment. This guide was then mailed twice (2 months apart) to the physicians in the experimental arm. Data on antibiotic prescribing practices were also collected. They demonstrated that inappropriate antibiotic prescriptions decreased 20.5% in the experimental group, compared with 5.1% in the control group. As with any randomized, controlled trial, true effect, confounding, bias, or random error could explain these results. Their study design, sample size calculations, and multivariate analyses reduced the chances of random error and other confounding factors, although the study's high refusal rate (19/30 NHs refused to participate), which could suggest that the study approach may not be generalizable to all NHs, could have introduced some bias. In addition, the need for an in-house pharmacist, because this intervention was essentially a pharmacist-directed intervention, could limit the applicability of this intervention. Nonetheless, the study demonstrated the effectiveness of mailing an antibiotic guide to physicians in reducing inappropriate antibiotic prescribing.

The second study, by Schwartz et al.,<sup>10</sup> evaluated the effectiveness of educational interventions targeted to physicians providing care at a single large hospital-based NH in Chicago, Illinois. Their intervention consisted of four teaching sessions, which included national guidelines, hospital resistance data, physician feedback, and distribution of booklets detailing institutional guidelines on optimal management of various infections found in NH residents. Their follow-up data showed improvement in the diagnosis of infection as reflected by the documentation of specific infections based on guideline-specific criteria. Furthermore, the authors noted improvement in antibiotic prescribing practices, aligning them more with their institutional

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guidelines for a sustained follow-up period of 2 years. Although their hospital-based NH facility had the advantage of on-site diagnostic capabilities and on-site infectious disease consultants, the study supports prior evidence that diagnosis and antibiotic prescribing can be improved in a sustained fashion by using educational interventions targeting healthcare providers.

These studies prompt the obvious next research questions: Do these educational interventions aimed at adhering to established guidelines and optimizing antibiotic prescriptions eventually lead to reductions in morbidity, hospitalizations, and death and declines in antibiotic resistance? Do these interventions reduce drug interactions and adverse drug events? What are the short- and long-term cost implications?

In summary, it is now well known that a significant proportion of antibiotic use in NHs is inappropriate and potentially harmful. Tough systemic challenges in diagnosing and effectively treating infections and the lack of clinical trials have limited prior efforts to optimize antibiotic use in this setting. Recent studies, including the two papers in this month's *JAGS*, offer simple interventions that could lead to a change in prescribing practices among NH physicians, although periodic education and reminders for all healthcare staff will be required for a sustained effect. Although the facilities that implement these interventions may differ from the study facilities, the proposed interventions are achievable under the leadership of an effective champion—an infection control practitioner or a medical director. With the growing body of evidence demonstrating the effectiveness of simple educational interventions, a proactive approach to curbing and eventually eliminating inappropriate antibiotic usage in NHs is no longer optional.

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