To Err Is Human broke the silence around patient safety, bringing awareness to the 98,000 preventable deaths per year caused by medical error in hospitals.\(^1\) Instead of asserting that these deaths were due to bad people working in health care, however, it provided a clear explanation that bad systems were to blame and needed to be made safer. In its wake, efforts to create a culture of patient safety emerged, using systems-based interventions to target multiple issues surrounding diagnostic errors, procedural events, health care–associated infections, and medication management. Antibiotic resistance and misuse are patient-safety issues, too. In response to rising antibiotic resistance and the dangerous consequences of antibiotic overuse and misuse, hospitals have adopted a culture of patient safety around antibiotic use through implementation of antibiotic stewardship programs.

Of course, antibiotic resistance is not just a threat in hospitals. Nursing homes are sites of high and frequently inappropriate antibiotic prescribing.\(^2\) Nursing home residents, with recurrent health care exposure and antibiotic use, frequently harbor antibiotic-resistant organisms. The number of nursing homes engaging in various antibiotic stewardship activities has grown in recent years.\(^3\) However, antibiotic stewardship programs remain immature in most facilities and identifying approaches to accelerate the growth of stewardship operations in nursing homes is a critical need.

Drawing from the experiences and resources of antibiotic stewardship in the hospital setting, Katz et al\(^4\) leveraged the existing “AHRQ Acute Care Hospital Toolkit to Improve Antibiotic Use” to create a 12-month education-based intervention adapted to the nursing home setting. The intervention took a patient safety approach and emphasized the importance of improved teamwork, clinical best practices, and the science of safety to encourage nursing facilities to expand their stewardship activities and impact. The educational bundle was delivered through webinars, posters, pocket cards, and virtual office hours with experts. It even cleverly rebranded the “Four Moments of Antibiotic Decision Making” framework for long-term care.\(^4\)

To assess the outcomes of this intervention, Katz et al\(^4\) compared key aspects of antibiotic utilization and antibiotic-related outcomes collected during the first 2 months of the 12-month intervention with the final 2 months of the study period. Overall changes in antibiotic use, urine cultures, and positive tests for *Clostridioides difficile* observed in this study were modest. During the last 2 months of the intervention, antibiotic starts per 1000 resident-days decreased by 0.41 from a baseline of 7.9 (0.41/7.9 = 0.052), and antibiotic days of therapy per 1000 resident-days decreased by 3.1 from a baseline of 64.1 days (3.1/64.1 = 0.048); thus, both measures decreased by approximately 5% compared with baseline values. The number of urine cultures collected during the last 2 months of the intervention was nearly 13% lower compared with the baseline period. While rates of positive tests for *C difficile* during the last 2 months of intervention were 10% lower than during the baseline period, this difference was not significant.

While the study by Katz et al\(^4\) is unquestionably the largest study of a nursing home antibiotic stewardship intervention ever conducted in the US, the study design and analytical approach make it difficult to ascertain a causal relationship between the intervention and observed outcomes. In the absence of a concurrent control group, it is impossible to exclude the possibility of secular influences on the changes in antibiotic utilization observed in study nursing homes. Outpatient fluoroquinolone prescriptions in the US have dropped 42% from 2015 to 2019.\(^5\) While it is debatable whether outpatient prescribing patterns can be applied to the long-term care setting, it is notable that much of the observed change in antibiotic utilization in this study was associated with reductions in...
fluoroquinolone prescriptions (antibiotic starts −14.1%; antibiotic days of therapy −11.2%) while participating facilities reported a variety of improvements in the structure and process of their antibiotic stewardship programs over the course of the study, 16% of participating nursing homes did not complete a follow-up survey, suggesting some potential for survivor bias in these results. Finally, the lack of a formal evaluation of the intervention, in at least a subset of participating nursing homes, makes it difficult to ascertain the exact mechanisms by which the intervention was associated with the observed outcomes.

Despite these limitations, the study by Katz et al highlights some important avenues for improving the quality of antibiotic prescribing in nursing homes. The Agency for Healthcare Research and Quality Safety Program is an accessible and relatively low-intensity intervention that the leadership in nursing homes with immature antibiotic stewardship programs can implement to enhance the structure and process of their programs. A clinical suspicion of urinary tract infection is the most common indication for initiating antibiotic treatment in nursing homes, and behavioral changes as well as other nonspecific changes in condition are the most common triggers for ordering urine cultures in this setting. The outcomes of interventions focused on limiting urine culture orders to residents with fever and/or localizing urinary tract symptoms have been shown in a recent cluster randomized trial and should be an initial area of focus in all nursing homes seeking to enhance local antibiotic prescribing practices. Third, the “Four Moments of Antibiotic Decision Making” introduced as part of this intervention draws needed attention to the potential value of postprescriptive interventions. While most nursing home stewardship intervention studies have focused on the prevention of unnecessary antibiotic treatments, there is increasing evidence that scheduled review and de-escalation of empirically initiated treatment courses can have a beneficial outcome in this setting. The growth of telehealth services in nursing homes as a result of the COVID-19 pandemic may increase the feasibility and effectiveness of prospective audit and feedback interventions, which will further enhance the role of postprescriptive stewardship interventions in nursing homes.

While the state of antibiotic stewardship remains embryonic in most nursing homes, the study by Katz et al provides promising evidence that improvements in quality are achievable on a large scale. To effectively build upon these results, future studies of antibiotic stewardship programs and interventions in nursing homes will need to make better use of program theory. Specifically, investigators should clearly describe the components of their intervention as well as the projected outcomes they have in the nursing home environment as well as health care worker decision-making and behaviors. Doing so will accelerate our understanding of the needed improvements in nursing home antibiotic stewardship infrastructure and help identify those interventions with the greatest impact on critical antibiotic utilization and outcome measures.

ARTICLE INFORMATION

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