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Inappropriate Medication Use in Hospitalized Older Adults—Is It Time for Interventions?

Medications are central to managing the health of older patients. In 2006, more than 93% of adults 65 years or older reported taking at least 1 medication in the last week, 58% reported taking 5 or more medications, and 18% reported taking 10 or more.¹ Medication use by older adults will likely increase further as the U.S. population ages, new drugs are developed, and new therapeutic and preventive uses for medications are discovered.²

Older patients, especially those who are chronically frail or acutely ill, may require special consideration when making prescribing decisions because of age-related changes in the metabolism and clearance of medications and enhanced pharmacodynamic sensitivities.³ Thus, panels of experts in pharmacology and geriatrics have compiled lists of medications to avoid prescribing for patients 65 years of age or older. The most commonly used list is the Beers criteria, which were introduced in 1991 to serve researchers evaluating prescribing quality in nursing homes. The Beers criteria were updated in 1997 and again in 2003 to include 48 “potentially inappropriate medications” (PIMs) for which, according to the consensus panel, there are more effective or safer alternatives for older patients.⁴

Numerous studies in the last 15 years have found that PIMs continue to be used in 12% to 40% of older patients in community and nursing home settings.⁵ To address the continued use of PIMs, the Centers for Medicare and Medicaid Services incorporated the Beers criteria into federal safety regulations for long-term care facilities in 1999.⁶ In 2006, the prescription rate of PIMs was introduced as a Health Plan and Employer Data and Information Set (HEDIS) quality measure for managed care plans.⁷ Despite adoption of the Beers criteria to monitor prescribing quality and safety in nursing homes and outpatient settings, there has been considerably less study of potentially inappropriate medication use in hospitalized patients.

In this issue of the *Journal of Hospital Medicine*, Rothberg and colleagues analyzed administrative data from nearly 400 hospitals across the United States and found that nearly *half* of all older patients hospitalized for 7 common conditions were prescribed at least 1 PIM.⁸ Thus, the incidence of PIM use in hospitalized older patients far exceeded that reported in most studies of community-dwelling or nursing home patients. Most notable, however, was the variability found in prescribing rates based on a number of physician and hospital characteristics. For example, although hospitalists and geriatricians were found to be less likely to prescribe PIMs than cardiologists and general internists, among high-volume cardiologists and internists, PIM prescribing rates ranged widely, from 0% to more than 90%.

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Similarly, hospitalwide prescribing rates varied by geographic region, and there were 7 hospitals in which not a single PIM was reportedly prescribed.

These findings raise three questions and bring to mind parallels with efforts to control inappropriate antimicrobial use. First question: Can inpatient use of PIMs truly be higher than outpatient use? Yes. The finding that more hospitalized patients are prescribed PIMs than ambulatory patients has face validity for several reasons. First, patients admitted for an acute hospitalization may have more comorbid diseases and take more medications than community-dwelling older adults. Second, new medications are typically added to treat acutely ill patients on hospitalization. Third, previous studies estimating outpatient PIM use have typically used more narrowly defined lists of PIMs and have not captured over-the-counter use of PIMs, particularly antihistamines.⁹ Diphenhydramine alone accounted for 9% of PIM use in Rothberg's study. Finally, as Rothberg and colleagues point out, this study was limited to certain diagnoses such as acute myocardial infarction that may have protocol-driven prescribing, which includes PIMs, that may be used only a single time such as promethazine.

Second question: Can PIM prescribing truly be so variable across regions, specialties, and individual hospitals and physicians? Yes. Using multivariable modeling, Rothberg and colleagues controlled for many patient, hospital, and physician characteristics and still found significant variation. John Wennberg and others have documented similar variations for a host of medical treatments; but although variation is interesting, it is *unwarranted* variation that matters for improving health care quality.¹⁰ It is not clear how much of the variation in prescribing rates of PIMs is unwarranted.

Some degree of variation in PIM prescribing rates is certainly acceptable. As the creators of the Beers criteria acknowledge, these medications are deemed only "potentially" inappropriate, and individual treatment decisions should be tailored to individual patients. However, others have taken the term "potentially inappropriate" one step further by recategorizing Beers medications as "always avoid" medications, "rarely acceptable" medications, and medications that indeed have "some indications" for use in older adults.⁸

Variation in prescribing practice may also be acceptable when there is not a clear consensus on the

superiority of one practice over another. Indeed, the evidence that PIM prescribing causes large numbers of clinically significant adverse drug events and patient harm is weak and largely based on observational studies with inconsistent results. Although some studies demonstrated an epidemiological association between Beers criteria medications and general adverse outcomes (eg, hospitalizations),¹¹ other studies did not.¹² A recent systematic review concluded that Beers criteria medications were associated with some adverse health effects, but the studies analyzed were too heterogeneous to support formal meta-analysis.¹³ Thus, variability in prescribing rates of Beers medications may simply reflect individual clinical judgment in the absence of conclusive outcomes data.

Third question: Can hospitalists use the findings of Rothberg and colleagues to improve the quality of medication prescribing for older adults in their institutions? Maybe. But hospitalists wishing to reduce PIM use in their institutions should draw lessons from other efforts to modify physician-prescribing practice such as efforts to reduce inappropriate antimicrobial use. Although national data draw attention to the high frequency of potentially inappropriate medication use in hospitalized patients, the large variation in use across hospitals confirms the need for monitoring in individual facilities. For example, the National Healthcare Safety Network provides national benchmarks of antimicrobial use and resistance, but individual hospitals monitor antibiotic use and resistance in their own institutions to tailor local efforts to improve antimicrobial prescribing.¹⁴

Also, initiating a quality improvement effort targeting all 48 Beers criteria medications may be an inefficient use of resources. Using such a composite measure obscures the contribution of the component medications, each of which possesses unique and sometimes controversial profiles of efficacy and harm for older patients. Instead, a targeted intervention addressing the most commonly prescribed Beers medications that have widely accepted alternatives could be more practical. For instance, many antibiotic management programs focus on replacing a popular, extended-spectrum antimicrobial with a narrow-spectrum agent as soon as microbiological susceptibility results are available.

Propoxephene is a PIM that may be an attractive target for intervention. Propoxephene was the third most commonly prescribed PIM identified by Rothberg and colleagues, but meta-analyses of

controlled trials have concluded that propoxyphene provides inferior analgesia for acute pain compared with that provided by other opioids with similar side effects, and has more adverse effects than nonopioid analgesics.¹⁵ Indeed, Rothberg found that just 3 of 48 PIMs (promethazine, diphenhydramine, and propoxyphene), each of which has viable alternative agents, accounted for approximately a quarter of all potentially inappropriate prescribing.

However, not all of the 48 Beers medications have alternatives with strong evidence of superiority. The Beers list includes medications (eg, amiodarone) that may not have equivalent alternative agents. On the other hand, some Beers medications have largely been supplanted (eg, ticlopidine or tripeleminamine), and identifying these medications may be an inefficient use of scarce patient safety resources. As with antimicrobial stewardship programs, local surveillance of PIM use should be combined with local consensus on appropriate alternatives to target PIM interventions.

Of course, once specific PIM use is targeted for improvement, a specific intervention must be implemented. Only a handful of studies have examined the effectiveness of interventions (eg, computerized pharmacy alerts) to reduce PIM use, and most of these have focused on the outpatient setting rather than hospitalized patients.³ One study that included hospitalized patients utilized a team approach (geriatricians, nurses, social workers, and pharmacists) and demonstrated a reduction in potentially inappropriate medication use but no reduction in adverse drug reactions during hospitalization.¹⁶ In light of the scarcity of controlled intervention trials to reduce PIM use, initiatives to reduce inappropriate antimicrobial prescribing may provide useful insights into the strengths and limitations of approaches such as clinician education, formulary restrictions, pharmacist review, and computer-based monitoring.¹⁷

Finally, any intervention to reduce PIM use should have reasonable expectations. The Beers criteria were developed to improve the effectiveness of medication therapy for older adults as well as to prevent harm, but it is unlikely that reducing PIM use in hospitalized patients will result in improvements that could be measured easily during an initial hospitalization. If preventing drug-induced harm during the hospitalization of older patients is the primary concern, a shift in focus is required. Safety efforts should be concentrated on

identifying and mitigating the most common and severe adverse drug events, rather than focusing efforts on reducing the use of PIMs. National data demonstrate that a handful of drugs—insulin, warfarin, and digoxin—most commonly cause severe adverse events in older outpatients.¹⁸ Optimizing the management of these medications may be another approach for improving drug safety in hospitalized patients. Regardless of the focus of a drug safety intervention, the experience of infection control and hospital epidemiology programs suggests that success will require dedicated professionals and the commitment of resources to examine patterns of local use, implement interventions, and monitor outcomes.

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