Medications and Falls in the Elderly: A Review of the Evidence and Practical Considerations

Elsaris Z. Riefkohl, PharmD, Heather L. Bieber, PharmD, Mark B. Burlingame, PharmD, BCPS, and David T. Lowenthal, MD, PhD

ABSTRACT

The syndrome of falls is a common and an often serious problem in elderly people. The cause of falls is multifactorial, and medication use can be a significant contributor. The observational nature of the research in this field makes it difficult to draw conclusions regarding medication use and falls in clinical practice, although psychotropic drugs appear to be most strongly associated with falls. Medication assessment is an important part of evaluating elderly patients at risk for falling.

INTRODUCTION

Falling is a common health problem for institutionalized and community-dwelling elderly people and is an important part of evaluating elderly patients at risk for falling. The rate of falls also rises with advancing age.2 Although most falls in older adults do not result in severe injury, 5% to 10% of falls do result in a serious outcome, such as fracture, head injury, or laceration.1 Furthermore, accidents are the fifth leading cause of death in older people, with falls contributing to two thirds of these deaths.1 Among people who fall and have fractures, those with hip fracture face the most serious consequences; approximately 20% of victims die within a year, and another 20% are institutionalized for the first time.3

The cause of falling can vary, and many risk factors have been identified. One risk factor is the use of certain types of medications, especially when used in combination. Published guidelines recommend a medication review as part of a comprehensive approach to the prevention of falls in the elderly.4,5

In this article, we discuss the published evidence examining the relationship between medication use and falls to provide a practical approach to the clinical evaluation of drug therapy in elderly patients at risk for falling.

MEDICATIONS AND THE RISK OF FALLS

Some of the intended and unintended pharmacological effects of drug therapy (e.g., sedation, psychomotor impairment, cognitive changes, dizziness, and orthostatic hypotension) might be expected to increase the risk of falls. Numerous published studies have sought to establish an association between medication use and risk of falling.

Meta-analyses

Leipziger et al. published two meta-analyses in 1999 in an attempt to clarify some of the issues surrounding medication use and falls.6,7 In the first study, the authors identified 40 trials, between 1966 and 1996, that evaluated the association between the use of sedative/hypnotic agents, antidepressants, neuroleptics, and psychotropic drugs and the risk of falls in people who were 60 years of age and older.8 None of the studies was a randomized, controlled trial. The authors analyzed the pooled data and calculated the odds ratios, they found a significant relationship between the use of psychotropic drugs—as a group as well as for the various classes of psychotropic drugs—and one or more falls.

In the second study, the authors identified 29 trials, in the same time period, that evaluated the association between the use of several classes of cardiovascular or analgesic drugs and falls in people 60 years of age and older.7 Again, none of these studies was a randomized, controlled trial. The authors found a significant relationship between the risk of falls and the use of inhibitors, calcium-channel blockers, beta blockers, centrally acting antihypertensive agents, and nitrates. No significant association was found between the use of any of the analgesic drug classes analyzed and the risk of falls.

According to these results of the meta-analyses, psychotropic drugs had the strongest association with falls, with cardiac and analgesic drugs having little or no correlation. The authors also found that patients using three or more medications appeared to be at an increased risk for recurrent falls.5,7

Benzodiazepines

Because of the potential for prolonged central nervous system side effects, it is generally recommended that long-acting benzodiazepines be avoided in older people. Therefore, one

Dr. Riefkohl and Dr. Bieber are Clinical Pharmacists and Dr. Burlingame is Clinical and Education Program Manager at the North Florida/South Georgia Veterans Health System in Gainesville, Florida. Dr. Lowenthal is Director Emeritus of the Geriatric Research, Education, and Clinical Center at the North Florida/South Georgia Veterans Health System and Professor of Medicine, Pharmacology, and Exercise Science at the University of Florida’s College of Medicine in Gainesville.
Medications and Falls in the Elderly

might assume that the use of these agents would pose a greater risk of falling than would the use of the short-acting benzodiazepines. However, results of studies that examined falls and both types of benzodiazepines have been variable.

Ray et al. studied nursing-home residents in order to quantify the rate of falls among those who took benzodiazepines and to see the variations with regard to the elimination half-lives of the drugs.8 Current benzodiazepine users experienced a rate of falls that was 44% greater than the rate for non-users. In cohort members for whom benzodiazepine use was new, the rate of falls was greatest in the first seven days after the initial therapy and remained elevated after the first 30 days of therapy. The rate of falls increased with longer elimination half-lives, although users of very-short-acting benzodiazepines (less than 12 hours) experienced an increased rate of falls during the night but not during the day.

Some studies of hospitalized patients have suggested that a greater risk of falling is associated with the use of short-acting benzodiazepines than with long-acting benzodiazepines. In one of these studies, patients taking lorazepam (Ativan®, Wyeth-Ayerst) and alprazolam (Xanax®, Pharmacia) had a higher rate of falls per dose dispensed than those taking diazepam (Valium®, Roche).9 In another study of hospitalized patients, the use of short-acting and very-short-acting benzodiazepines was positively associated with falls, whereas the use of long-acting benzodiazepines was not.10

Ensrud et al., conducting a prospective, multicenter cohort study in community-dwelling women 65 years of age and older, concluded that the use of both short-acting and long-acting benzodiazepines was associated with frequent falls, compared with the rate for those not taking these drugs; however, the confidence interval (CI) for both classes of benzodiazepines overlapped (1.0).11

Studies examining exposure to benzodiazepines and the risk of hip fracture—rather than the risk of falls—have suggested that short-acting benzodiazepines do not confer a safety advantage over long-acting benzodiazepines.12,13 One of these studies also indicated an increased fracture risk for those taking higher doses of all benzodiazepines as well as a greater risk for patients in the early stages of their benzodiazepine therapy and also for patients who have taken benzodiazepines for longer than a month.13

On the basis of these results, it is difficult to make practice decisions about the risk of falling and the relationship to long-acting versus short-acting benzodiazepines. Perhaps clinicians should weigh the advantages and disadvantages of all categories of benzodiazepines when making treatment decisions for elderly people at risk for falls.

Antidepressants

Because the use of selective serotonin reuptake inhibitors (SSRIs) is generally preferable to the use of tricyclic antidepressants (TCAs) in older patients, one might postulate that SSRIs are associated with a reduced risk of falls compared with TCAs. However, published data examining different classes of antidepressants and falls indicate that older people who use SSRIs might not be any safer than those who use TCAs.

Two studies, one in the nursing-home setting and the other in the community setting, suggest a higher risk of falls for users of SSRIs than for users of TCAs.11,14 Another nursing-home study documented a significantly greater rate of falls in users of both TCAs and SSRIs.15 Furthermore, the fall rate increased with increasing doses for each class of antidepressant. These data suggest that elderly people who begin therapy with any antidepressant should be considered at risk for falling.

Antihypertensive Drugs

Antihypertensive agents as a class also receive a great deal of attention from clinicians who evaluate patients at risk for falls. Some practitioners are concerned that the blood pressure–lowering effects of these drugs might contribute to orthostasis and dizziness. Of course, acute treatment of hypertension can result in orthostatic hypotension through several mechanisms; however, chronic therapy is rarely associated with orthostasis. In fact, it is possible that antihypertensive drugs might improve the cerebral and systemic vascular responses to hypotensive stress and may reduce postprandial declines in blood pressure.16 Furthermore, an increased risk of falls has not been associated with the use of antihypertensive drugs.7,17–19

So far, it appears that the use of chronic antihypertensive therapy should not be a major concern, although individual cases of documented antihypertensive-induced orthostasis should not be ignored.

Anticonvulsants

The results of the prospective cohort study in elderly women by Ensrud et al. (see the earlier discussion of benzodiazepines and antidepressants), also noted a significantly greater risk of falls in patients using anticonvulsant agents.11 The authors concluded that community-dwelling elderly women who were using medications that affect the central nervous system experienced an increased risk of falling; however, narcotic use was not associated with an increased risk.

Summary of Evidence

Although the varied results from the research make it difficult to derive conclusions regarding medications and falls in the elderly, we can generalize as follows:

1. Psychotropic agents are associated with an increased risk of falling, and caution is warranted with all of these drugs. Anticonvulsants, class IA antiarrhythmics, and digoxin (e.g., Digitek®, Bertek; Lanoxin®, GlaxoSmithKline) might also be associated with an increased risk of falls.
2. The chronic use of antihypertensive drugs is probably not associated with an increased risk of falls.
3. Potentially important pharmacotherapeutic factors, other than the drug or the drug class, include the use of multiple medications and the dosages taken.

INTERVENTION STUDIES

Most intervention studies on falls provide limited or no details about the medications taken by the study population. Perhaps one of the best-known studies in which a medication review was specifically identified as part of a multifaceted intervention was a trial conducted by Tinetti and colleagues in a community-based population.20 In this study, sedatives were
withdrawn and the number of medications was decreased. The intervention group demonstrated a relative risk reduction of 31% for falls.

Other studies targeting the reduced use of psychotropic, cardiovascular, and analgesic drugs have also reported success in decreasing the risk of falls in older people. We reported the use of medications as a major contributing factor to the risk of falling in 25% of patients evaluated in our falls clinic; the most frequent recommendations about medication use involved the class of psychotropic drugs.

PRACTICAL CONSIDERATIONS

To evaluate the medication regimens of older patients who might be at risk for falls, clinicians should combine an evidence-based approach with a knowledge of the potential effects of drug therapy. The evaluation should also be performed in the context of:

- the patient’s history of falls.
- an appropriate laboratory assessment.
- a gait and balance assessment.
- a comprehensive physical examination, including:
  - a vision examination.
  - a measurement of postural blood pressure.
  - a targeted neurologic, musculoskeletal, and cardiovascular examination.

Medication History

Before a medication regimen can be assessed, clinicians must have an accurate listing of all drugs used. Therefore, a vitally important aspect of the medication evaluation is the medication history.

Patients in the community setting often take prescribed drugs in a way that differs from the instructions that are listed in the medication profile in the medical record. It is helpful when ambulatory patients bring their medications with them to clinic visits.

Clinicians should take care to ask patients about over-the-counter drugs and herbal products they are taking, because patients do not always think of these as “medications.”

Clinicians should also ask about adverse reactions to previous medications and about perceived side effects of their current prescriptions.

Inquiring about alcohol consumption is also important, because alcohol can contribute to the risk of falls.

As part of the medication history, physicians should ask patients whether certain drugs, particularly analgesics, have been effective in alleviating their symptoms. In our experience, many patients who have used drugs such as propoxyphene (e.g., Darvon®, NeoSan) and gabapentin (Neurontin®, Pfizer) for pain report minimal or no positive effects, but they continue to take such medications because a health care provider has prescribed them. Furthermore, ineffective analgesia may inhibit patient participation in any prescribed physical rehabilitation programs, such as balance and strength-training exercises.

Minimizing the Use of Drugs Associated with the Risk of Falls

Published practice guidelines recommend the following:

- Patients who have fallen should have their medications reviewed and altered or stopped as appropriate in light of their risk of future falls. Particular attention to medication reduction should be given to older persons taking four or more medications and to those taking psychotropic drugs.

Although psychotropic drugs (e.g., benzodiazepines, antidepressants, antipsychotic agents) may be the initial focus of a medication review, other drugs and drug classes may have intended or unintended pharmacological effects that can increase the risk of falling and thus might also be considered “high risk” in some cases.

Table 1 lists drugs and drug classes for clinicians to consider when they are assessing drug regimens in patients at risk for falls. Others to be targeted for elimination or a reduction in dose include the following:

- drugs that are ineffective
- drugs that are thought to be causing adverse effects
- drugs for which a therapeutic duplication might exist
- drugs for which an indication is not known or documented
- drugs for which the dose seems to be high for an older person

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Drugs and Drug Classes to Consider in Evaluating Elderly Patients with an Increased Risk of Falling*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antidepressants† ‡</td>
<td><strong>Antipsychotics†</strong></td>
</tr>
<tr>
<td>Benzodiazepines†</td>
<td><strong>Antihypertensives</strong></td>
</tr>
<tr>
<td>Antihistamines§</td>
<td><strong>Anticonvulsants†</strong></td>
</tr>
<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
<td><strong>Corticosteroids</strong></td>
</tr>
<tr>
<td>Muscle relaxants</td>
<td><strong>Narcotic analgesics</strong></td>
</tr>
<tr>
<td>Digoxin†</td>
<td><strong>Antiarrhythmics (type IA†)</strong></td>
</tr>
<tr>
<td>Nitrates</td>
<td><strong>Histamine H2-receptor blockers</strong></td>
</tr>
<tr>
<td>Hypoglycemics</td>
<td><strong>Antiparkinson drugs</strong></td>
</tr>
</tbody>
</table>

* Not all drugs and drug classes listed have been associated with falls in published research. Therefore, this list should be used in the context of a comprehensive clinical assessment for each individual patient.

† Published research suggests an association between the use of this drug or drug class and an increased risk of falling.

‡ Includes selective serotonin reuptake inhibitors (SSRIs).

§ Especially sedating antihistamines, such as diphenhydramine HCl (e.g., Benadryl®, Pfizer) and hydroxyzine (e.g., Atarax®, Pfizer).

continued on page 733
Medications and Falls in the Elderly

continued from page 726

Assessing Patients for Untreated Conditions

In the overall patient assessment, clinicians should consider instituting drug therapy when it might help to improve functional status, as in patients with untreated or poorly controlled conditions, including Parkinson’s disease, benign prostatic hyperplasia, pain, and depression.

Deficiencies of some vitamins (e.g., B₁₂27 and D28) and hormones (e.g., testosterone deficiency in males29 and hypothyroidism30) are more common in elderly people and may contribute to symptoms that interfere with functional status. Clinicians should consider screening for vitamin deficiencies, and supplementation may be needed in selected individuals. Patients with osteopenia and osteoporosis should receive calcium and vitamin D as well as anti-resorption drugs when necessary.

SUMMARY

Falling is a common health problem in the elderly population. The use of medications is one of the many different factors that can contribute to balance problems and the risk of falls. Clinicians should make decisions about drug therapy based upon published research about falls and a knowledge of desirable and undesirable drug effects. Integral practice-based components of medication assessment include taking the patient’s medication history, minimizing the use of high-risk drugs, and managing uncontrolled diseases and disorders. A thorough assessment of medication regimens and skillful medication management can reduce the risk of falls in elderly people.

REFERENCES