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# Medications as a Risk Factor in Falls by Older Adults with and without Intellectual Disabilities

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## Case Study

### Medications as a Risk Factor in Falls by Older Adults with and without Intellectual Disabilities

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#### Educational Objectives

1. Review common intrinsic and extrinsic risk factors for falls by older adults.
2. Compare risk factors for older adults with and without intellectual disabilities.
3. Focus on medications as a risk factor among a complexity of risk factors.
4. Suggest steps to improve appropriateness of medication regimens, as a step to help reduce risk for falls.

#### Background

Falls are a too common and much feared aspect of life for many older adults. The consensus from research is that about 30-40% of community-dwelling adults ages 65+ have fallen in the past year,

increasing to about half of those age 80 and above. A new study (Hsieh et al, 2012) using retrospective data of 1,515 adults with intellectual disabilities found a similar percentage among those 65+, with no further sub-analysis among those 80 and above. Importantly, Hsieh and colleagues found rates of falls among younger ages that were comparable to rates of older adults without intellectual disabilities. Our Virginia Geriatric Education Center team found well over a dozen definitions of what constitutes a fall, and this muddles generalizations from studies employing a variety of criteria. Our team chose as most useful: "A fall is an unplanned descent to the floor (or an extension of the floor) with or without injury." So, feeling dizzy and choosing to sit would not be considered a fall but other unintentional losses of balance that "plopped" one onto a chair or bed rather than onto the floor would be.

Research suggests that interventions to reduce risk for falls tend to be most successful when the intervention is multi-faceted and targets those with the most critical risk factors. This case study will review

various risk factors briefly but cannot be comprehensive. It will concentrate its focus more on medications, which, in fact, are associated with several of the most critical risk factors. Even there, the appraisal is limited by space.

#### Falls as a Signal

"Causes" of falls are often indefinite and complex, so health care researchers and practitioners have identified a number of risk factors that are associated with falling. These risk factors are clinically identified as either intrinsic or extrinsic. Intrinsic factors refer to characteristics or conditions of the individual, such as vision, gait, and health history. Extrinsic factors refer to conditions outside the individual, such as environmental hazards but also medications taken by the individual, brought into the body, that others may have prescribed.

As might be seen, falls may be a signal of other geriatric syndromes, such as falling when rushing to the bathroom because of incontinence or falling because of worsening sensory input from poor vision or

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hearing. Falls may be the cause or the effect of frailty. Falls may precipitate a downward cascade in quality of life. And so on. Clearly, reducing one's risk of falls deserves great attention from older adults, family caregivers, health care providers, agency staff, and others who are concerned.

### **Fall Risk Factors**

Intrinsic and extrinsic risk factors tend not to exist separately, in isolation, for they are frequently inter-related, as when balance disorders lead to medications being prescribed and vice versa. There is an interaction and probable synergism among multiple risk factors. They can relate and multiply. The risk of falling increases as the number of risk factors increases. There is not a direct and linear cause and effect. But identifying and addressing risk factors for falling does help to reduce its likelihood.

#### Intrinsic Risk Factors

Some of the common intrinsic risks include: lower extremity weakness; previous falls; gait and balance disorders; impaired vision; depression; functional and cognitive impairment; dizziness; low body weight; urinary incontinence; orthostatic/postural hypotension (a notable drop in blood pressure from sitting to rising); female gender; and being over age 80. Some intrinsic risk factors are simply not modifiable; some are.

#### Extrinsic Risk Factors

The more important extrinsic risk factors include: medications, especially polypharmacy (taking four or

more prescription medications); psychotropic medications (medications that affect the mind and behavior); and environmental hazards, such as poor lighting; loose rugs or carpets; lack of bathroom safety equipment, and improper foot wear, like slippers that provide no support. Generally, extrinsic factors are modifiable.

#### The Most Critical Risk Factors

For more than 20 years, geriatrician Mary Tinetti and colleagues have focused on risks for falling and interventions to reduce those risks. Her landmark randomized controlled intervention trials with community-dwelling elders in Connecticut (Tinetti et al., 1994) and subsequent work (e.g., Tinetti & Kumar, 2010) have identified the most critical risk factors for intervention. Pragmatically, she argues that health care practitioners should target the risks that they can fix most readily, through screening and interventions (Tinetti & Kumar, 2010). Tinetti and Kumar's updated fall risk factors suggest that screening and intervention should target older adults with: previous falls; balance impairment; muscle weakness; dizziness/orthostasis; female sex; low body weight; diabetes; gait impairment; vision impairment; and/or cognitive impairment. Notably, several of these factors may precipitate or be the result of medications. Hsieh et al. (2012) identified similar significant risk factors among adults with intellectual disabilities: female sex, having arthritis, having a seizure disorder, polypharmacy, using walking aids, and having difficulty lifting or carrying over 10 pounds. Specifically, among those without a seizure dis-

order, Hsieh and colleagues found statistically significant risk factors for falls were having a higher level of intellectual disability, having arthritis, back pain, a heart condition, urinary incontinence, using a walking aid, and having difficulty walking three blocks.

### **Medications as a Risk Factor**

Older adults may be at greater risk of falling because they may have multiple chronic conditions like high blood pressure, arthritis, sleep problems, etc., for which medications are prescribed; moreover, there are likely multiple prescribers involved who may or may not know what others are prescribing for the older adult. The older adult may be taking multiple medications, both prescribed and over-the-counter, and there may be a significant mix of medications being taken. This mix may lead to unintended consequences, including lessened or heightened therapeutic results or adverse drug events. Note that these situations apply across the board to older adults with or without lifelong disabilities. Many medications go to market having few adults ages 75 and above in the clinical trials that tested the drug.

Surprisingly, there have been few randomized controlled trials to study the effect of a specific medication on risk of falling. And, as noted earlier, interpretation of the studies has been complicated by variations in fall definitions. However, psychotropic medications are strongly related to risk for falls; the use of sedatives and hypnotics, antidepressants, and benzodiazepines (prescribed for anxiety, insomnia, muscle spasms) demon-

strates a significant association with falls in older adults (Wolcott et al., 2009; AGS/BGS, 2010, 2011).

Importantly, several of the most frequent manifestations of adverse drug events are risk factors themselves for falling; these adverse drug effects include orthostatic/postural hypotension (a precipitous drop in blood pressure when rising), bradycardia (heart rate that is too slow), cognitive changes, and dizziness. Falling may represent the final common pathway of cumulative adverse drug events (Agostini & Tinetti, 2002). So, it is prudent to take steps to ensure that medications are both appropriate and taken correctly.

### Case Study #1

Anthony, age 43, has mild to moderate intellectual disability due to difficulties at birth during delivery. He is the youngest of four children and is doted upon by his three sisters. He lives with his parents and participates in a sheltered workshop where he helps assemble materials for promotions and marketing contracts that the agency obtains. He's active in his church and accompanies his father to monthly meetings and outings of his Knights of Columbus chapter. Only slightly overweight, he nonetheless has high blood pressure, which his physician is treating aggressively. Recently, he began experiencing dizziness and mood changes and he has communicated his apprehension about leaving the safety of his home. He sits in his room. For his high blood pressure, Anthony takes hydrochlorothiazide 25 mg/metoprolol succinate 200 mg (Dutoprol®) daily. He was recently prescribed lorazepam 0.5 mg (Ativan®) daily

for symptoms of anxiety. His dose of Dutoprol® was recently increased to the maximum recommended dose. Metoprolol causes dizziness in 3-10% of adults and bradycardia in 5% of patients. The higher the dose, the greater the risk of experiencing these adverse drug events. It is important to ask about symptoms of dizziness and to monitor Anthony's pulse and blood pressure (sitting and standing) to be sure that he is not experiencing side effects that may increase his risk of falling. His symptoms of dizziness may be related to his blood pressure medication, considering that the dose of his blood pressure medications was increased just before the dizziness started. Fortunately, there are many different medications available to manage high blood pressure and an alternative may not result in the same side effects. Lorazepam also increases Anthony's risk of falling. This medication should be used temporarily at the lowest possible dose. Long term treatment with benzodiazepines should be avoided whenever possible. Non-medication therapy can be helpful in both hypertension (exercise and a healthy diet) and anxiety (cognitive behavioral therapy or relaxation techniques).

### Case Study #2

Ethel is a 72-year-old widow who lives alone in the home where she and her husband raised their two children. They each live nearby. While she has always considered herself to be healthy, she has recently been plagued by painful arthritis, troubling problems with her vision, joint pain, and cardiovascular problems. Her appoint-

ment book is filled with names of physicians. Last weekend, she fell and bruised herself badly when leaving her house. Ethel is taking one acetaminophen 500 mg (Tylenol Extra Strength®) three times per day for arthritis. For pain unrelieved by acetaminophen, she takes tramadol 100 mg (Ultram®) three times per day as needed. Recently she has been taking tramadol two-three times a day. Ethel also takes zolpidem 10 mg (Ambien®) occasionally when her arthritis pain makes it difficult for her to fall asleep. For her cardiovascular problems, Ethel takes atorvastatin 20 mg (Lipitor®) daily to lower her LDL cholesterol and hydrochlorothiazide 25 mg daily for high blood pressure. Ethel's most significant medication-related risk for falling is her use of psychotropic medications, particularly as needed tramadol and zolpidem. To reduce her use of tramadol, Ethel can try increasing her scheduled acetaminophen dose to 1000 mg two-three times per day. Topical analgesics may also help. Management of chronic pain is important for quality of life, so it is necessary to balance the risks and benefits of drug treatments. Zolpidem should only be used for the short-term treatment of insomnia and at the lowest effective dose. Older adults and women are at higher risk for adverse events (impaired balance and cognition, falls) from zolpidem, and a lower dose of 5 mg daily as needed is recommended. Taking tramadol and zolpidem simultaneously is particularly troublesome, as the adverse events are exaggerated. Blood pressure lowering medications can also increase the risk of falling, so periodic monitoring to be sure that the blood pressure does

not drop too low when standing is also important. Tramadol can also enhance the orthostatic hypotensive effects of hydrochlorothiazide. Whenever multiple medications are being taken, their interactions with each other should be considered.

### **Interventions Related to Medications**

Tinetti and colleagues (1994, 2010) identified several interventions that reduced falls by older adults. (Notably, even the most comprehensive interventions do not eliminate the risk for falls.) When orthostatic/postural hypotension was present, with the individual experiencing a precipitous drop in blood pressure on rising, behavior modification and medication review/change proved helpful. For example, teaching the individual to rise from a chair more slowly and to use a chair with a higher and more firm seat lessened the risk, as did, of course, modifying medications that can cause the drop in blood pressure in the first place. Use of benzodiazepines (psychotropics for anxiety, insomnia, muscle spasms, etc) may be modifiable, with tapering off sometimes possible; if not, instruction in appropriate use helped. Multiple medications in one's drug regimen which prompted involvement of the person's primary care provider to conduct serious review of each medication's indication, dosage, adverse effects, interactions, and so on, resulted in changes in medications and improved communication among providers. While Hsieh et al. (2012) employed secondary analysis of data from the Longitudinal Health and Intellectual Disability Study and did not involve clinical inter-

ventions, it seems reasonable, given the similarities among risk factors for falls by older adults with and without intellectual disabilities, that a focus on medications is prudent. Notably, seizure disorders and other health conditions (arthritis, heart condition, back pain, and urinary incontinence) for which prescribed medications are the most common treatment modality emerged as the most important risk factors, as well as the risk factors for fall-related injuries requiring medical care (Hsieh et al., 2012).

Some more specific suggestions follow.

#### The Medication History

Older adults, family caregivers, and health care providers can help reduce the risk for falls by careful appraisal of the medications that the older adult is taking. An accurate medication history is important but can take some detective work to obtain. The medication history needs to be comprehensive. The current medication list should include: prescription medications, over the counter medications, dietary supplements or herbal products, alcohol and other recreational drugs (AGS/BGS, 2010, 2011). For each medication, it is necessary to record the dose, time(s) taken each day, frequency of use for "as needed" medications, and indication (why the person is taking the medication). In the latter case, there are occurrences where someone is still taking a drug long after it ceased being needed. Discrepancies between the patients' understanding of what they should be taking, what they actually are taking, and what healthcare providers record on their

medication lists are common.

#### Screening for Medication-Related Fall Risk

The "Brown Bag" review where all medications are literally or figuratively put together in a paper bag offers an opportunity to determine how the older adult patient is actually taking medications and to inquire about medication effectiveness and possible adverse events (Steinman & Hanlon, 2010). Significant questions to ask include:

1) Is the person taking more than four medications?

2) Is he or she taking psychotropic medications? These include sedatives, antipsychotics, antidepressants, antiepileptic medications, benzodiazepines, and anticholinergic medications (which block receptor sites of the neurotransmitter acetylcholine). Many of these medications appear on the Beers list of potentially inappropriate medications older adults

([www.americangeriatrics.org/health\\_care\\_professionals/clinical\\_practice/clinical\\_guidelines\\_recommendations/2012](http://www.americangeriatrics.org/health_care_professionals/clinical_practice/clinical_guidelines_recommendations/2012)). Psychotropic medications are among the most frequently prescribed for individuals with developmental disabilities, because of anxieties, spasms, etc. Also, as persons with Down's syndrome age, they are more likely to be taking antiepileptic medications (Sipes et al., 2011).

3) Is the person taking medications that cause bradycardia (slowing of heart beat)? Such drugs include digoxin,  $\beta$  blockers (metoprolol, atenolol®), non-dihydropyridine



calcium channel blockers (diltiazem, verapamil), and amiodarone. Note that here and in the following we name just some of the drugs within each type.

4) Is the person taking medications that can cause orthostatic/postural hypotension? These drugs include the very large number of antihypertensives, anti-emetic phenothiazines (promethazine, prochlorperazine), tricyclic antidepressants (amitriptyline, nortriptyline), anti-Parkinsonian drugs, diuretics, and any phosphodiesterase-5 enzyme inhibitor (Viagra®, Cialis®). Cardiovascular disease, including hypertension, is the most common cause of mortality in individuals with developmental disabilities.

5) Is the person experiencing symptoms that might be an adverse drug event? Such symptoms include blurred vision, dizziness or light-headedness, sedation or decreased alertness, confusion or impaired judgment, compromised neuromuscular function, and anxiety.

#### Issues Significant for Those with Developmental Disabilities

Psychotropic medication use without a documented indication is common. Medication adherence, particularly in community settings, may be a challenge. Side effects can worsen spasticity, worsen extremity weakness or other symptoms related to the underlying disability. The risk versus benefit of each medication must be considered, and the balance may shift as the individual ages. "As needed" medications may be especially problematic, as monitoring by family and agencies may be inconsistent

at best (Kim et al, 2011).

#### Vitamin D to Reduce Fall Risk

There is a protective effect of vitamin D supplementation on fall prevention in community-dwelling older adults and among adults with intellectual disabilities. The effect of vitamin D on fall reduction is significant, when taken for longer than six months, in a dosage of 800 IU or greater, and in the form of cholecalciferol therapy (Vitamin D3) (Bischoff-Ferrari et al., 2004; Kalyani et al., 2010). Vitamin D decreases the risk of falling by improving lower extremity muscle strength and balance. It also improves calcium absorption and bone health, reducing the risk of fracture if a fall occurs.

Adults with developmental disabilities may be at increased risk of osteoporosis due to antiepileptic medications, lack of weight bearing exercise, use of steroids such as prednisone, and long term use of proton pump inhibitors for acid reflux and chronic indigestion. Any of these factors may increase the risk for osteoporosis, with the risk increasing as the number of these risk factors rises. Having osteoporosis increases the risk of a fracture when a fall occurs, so maintaining bone health is critical.

#### **Summary**

Tinetti and colleagues (1994, 2010) and others have suggested strategies to reduce risks for falling that are applicable to adults with or without lifelong disabilities. Medication review and careful scrutiny of effects, and more engagement with the primary care provider are

among these. For adults with lifelong disabilities, family caregivers and agency staff may need to become more vigilant in monitoring medications, informing multiple prescribers, overseeing improvements in diet and exercise, and other steps to inform and engage these adults in their own health care. Group homes may wish to designate a medication manager. Older adults, family caregivers, and/or agency staff should keep a medication list (see [www.medsandaging.org/documents/PersonalMedList\\_000.pdf](http://www.medsandaging.org/documents/PersonalMedList_000.pdf)) and consult with a physician, nurse practitioner, or pharmacist before using over-the-counter medication or herbal supplements.

#### **Study Questions**

1. Among the many intrinsic and extrinsic risk factors for falls, why are medications a prudent place to focus?
2. The relatively scarce research on falls by older adults with lifelong disabilities identifies seizure disorders as a special risk. Why is this and what are some practical implications?
3. Identify three or more things to look for in conducting a Brown Bag review of medications as a risk factor for falls?

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