

High-Risk Medications Attributed to Falls in Older Adults

PSYCHOTROPICS	ANTICONVULSANTS	SEDATIVE-HYPNOTICS
<p style="text-align: center;">Antidepressants</p> <p>SSRIs Citalopram (Celexa®) Escitalopram (Lexapro®) Fluoxetine (Prozac®)* Fluvoxamine (Luvox®) Paroxetine (Paxil®) Sertraline (Zoloft®) ADE: 1,3,4,7,8,10</p> <p>5-HT2 Antagonist Nefazodone (Serzone®)*¹¹ Trazodone (Desyrel®) ADE: 1,2,3,4,7,8,10</p> <p>TCAs Amitriptyline (Elavil®)* Amoxapine (Ascenden®) Clomipramine (Anfranil®) Desipramine (Norpramin®)*¹¹ Doxepin (Sinequan®, Zonalon®)* Imipramine (Tofranil®) Maprotiline (Ludiomil®) Nortriptyline (Aventyl®) Protriptyline (Vivactil®) Trimipramine (Surmontil®) ADE: 1,3,4,5,7,8,9,10</p> <p style="text-align: center;">Antipsychotics</p> <p style="text-align: center;">Typicals Chlorpromazine (Thorazine®) Perphenazine (Trilafon®) Fluphenazine (Prolixin®, Permitil®) Pimozide (Orap®) Haloperidol (Haldol®) Thioridazine (Mellaril®) Loxapine (Loxitane®) Thiothixene (Navane®) Mesoridazine (Serentil®) Trifluoperazine (Stelazine®) Molindone (Moban®) ADE: 1,3,4,5,7,8,10</p> <p style="text-align: center;">Atypicals Aripiprazole (Abilify®) Quetiapine (Seroquel®) Clozapine (Clozaril®) Risperidone (Risperdal®) Olanzapine (Zyprexa®, Zydys®) Ziprasidone (Geodon®) ADE: 2,3,4,5,7,8</p> <p style="text-align: center;">Anxiolytics</p> <p style="text-align: center;">Benzodiazepines – Long-Acting Chlordiazepoxide (Librium®)* Diazepam (Valium®)* Clonazepam (Klonopin®) Flurazepam (Dalmane®)* Clorazepate (Tranxene®)* Quazepam (Doral®)* ADE: 1,2,3,4,5,6,8,10</p> <p style="text-align: center;">Benzodiazepines –Short-Acting Alprazolam (Xanax®)* Estazolam (ProSom®) Lorazepam (Ativan®)* Oxazepam (Serax®)* Temazepam (Restoril®)* Triazolam (Halcion®)* ADE: 1,3,4,5,6,8,10</p>	<p>Carbamazepine (Tegretol®)*¹¹ Divalproex sodium (Depakote®) Ethosuximide (Zarontin®) Felbamate (Felbatol®) Gabapentin (Neutontin®) Levetiracetam (Keppra®) Methsuximide (Celontin®) Oxcarbazepine (Trileptal®) Phenobarbital (Luminal®)*¹¹ Phenytoin (Dilantin®)*¹¹ Pregabalin (Lyrica®) Primidone (Mysoline®) Tiagabine (Gabatril®) Topiramate (Topamax®) Zonisamide (Zonegran®) ADE: 1,3,4,5,6,7,8,10</p> <p style="text-align: center;">OPIOIDS</p> <p>Codeine (Tylenol with Codeine®) Fentanyl (Duragesic®, Actiq®) Hydrocodone (Vicodin®) Hydromorphone (Dilaudid®) Levorphanol (Levo-Dromoran®) Meperidine (Demerol®)* Methadone (Dolophine®) Morphine (MS Contin®) Oxycodone (Percocet®) Oxymorphone (Numorphan®) Pentazocine (Talwin®)* Propoxyphene (Darvon®)* ADE: 1,2,3,4,5,6,7,8,9,10</p> <p style="text-align: center;">SKELETAL MUSCLE RELAXANTS AND ANTISPASMODICS</p> <p>Baclofen (Lioresal®)* Carisoprodol (Soma®)* Chlorzoxazone (Parafon Forte®)* Cyclobenzaprine (Flexeril®)* Methocarbamol (Robaxin®)* Metaxalone (Skelaxin®) Tizanidine (Zanaflex®) ADE: 1,3,4,9,10</p> <p style="text-align: center;">GASTROINTESTINALS</p> <p>Cimetidine (Tagamet®)* Clindinium with Chlordiazepoxide (Librax®)* Dicyclomine (Bentyl®)* Famotidine (Pepcid®) Hyoscyamine (Levsin®) Metoclopramide (Reglan®) +5 ADE: 1,4,8</p> <p style="text-align: center;">NSAIDS</p> <p>Diflunisal (Dolobid®) Etodolac (Lodine®) Ibuprofen (Motrin®, Advil®) Indomethacin (Indocin®)* Ketoprofen (Orudis®) Nabumentone (Relafen®) Naproxen (Aleve®, Naprosyn®)* Piroxicam (Feldene®)* ADE: 1,2,3,4,7,8,11</p>	<p>Amobarbital (Amytal®)* Butobarbital (Butisol®)* Chloral Hydrate (Noctec®) Eszopiclone (Lunesta®)*⁶ Mephobarbital (Mebaral®)* Meprobamate (Miltown®, Equanil®)*^{+6,7,9,10} ADE: 1,2,4,5,8</p> <p>Paraldehyde (Paral®) Pentobarbital (Nembutal®)* Secobarbital (Seconal®)* Zaleplon (Sonata®) Zolpidem (Ambien®)*</p> <p style="text-align: center;">MISCELLANEOUS DRUGS/DRUG CLASSES</p> <p>The following drugs/drug classes are associated with adverse drug effects which may contribute to falls. Further correlation studies are warranted.</p> <p>Digoxin (Lanoxin®)* >0.125mg/d ADE: 4,8</p> <p>Antirhythmics: Disopyramide (Norpace®) ; Quinidine (Quinidex®) ,¹¹ ; Procainamide (Procan®/Procanbid®, Pronestyl®); Amiodarone (Cordarone®)* ADE: 1,3,4,7,9,10</p> <p>Antihypertensive Agents:</p> <ul style="list-style-type: none"> • Centrally-Acting: Clonidine (Catapres®) ; Methyldopa (Aldomet®)*¹¹ ADE: 1,3,4,5 • Beta Blockers: Acebutolol (Sectral®); Atenolol (Tenormin®); Betaxolol (Kerlone®); Bisoprolol (Zebeta®); Carteolol (Cartrol®); Carvedilol (Coreg®); Labetalol (Normodyne/Trandate®); Metoprolol (Lopressor®, Toprol XL®); Nadolol (Corgard®); Penbutolol (Levatol®); Pindolol (Visken®); Propranolol (Inderal®); Sotalol (Betapace®); Timolol; Blocadren®) ADE: 1,2,3,4,5,9,10 • Alpha Blockers: Doxazosin (Cardura®) ; Prazosin (Minipress®); Tamsulosin (Flomax®); Terazosin (Hytrin®) ADE: 1,3,4,7,9,10 • ACE Inhibitors: Benazepril (Lotensin®); Captopril (Capoten®),¹¹; Enalapril (Vasotec®); Fosinopril (Monopril®); Lisinopril (Zestril/Prinivil®),¹¹; Moexipril (Univasc®); Perindopril (Aceon®); Quinapril (Accupril®); Ramipril (Altace®); Trandolapril (Mavik®) ADE: 1,3,4,5,8,9 • Ang I Type 1 Receptor Blockers (ARBs): Candesartan (Atacand®); Eprosartan (Teveten®); Irbesartan (Avapro®); Losartan (Cozaar®); Olmesartan (Benicar®); Telmisartan (Micardis®); Valsartan (Diovan®) ADE: 1,3,4,11 • Calcium Channel Blockers: Amlodipine (Norvasc®); Diltiazem (Cardizem®); Felodipine (Plendil®); Isradipine (Dynacirc®) Nifedipine (Procardia/Adalat®)* ; Nimodipine (Nimotop®); Verapamil (Calan/Isoptin®) ADE: 1,3,4,5,7,9,10 • Thiazide Diuretics: Chlorthalidone (Hygroton®); Hydrochlorothiazide (Hydrodiuril®); Torsemide (Demedex®); Metolazone (Zaroxlyn®) ADE: 1,3,4,7,11 • Loop Diuretics: Bumetanide (Bumex®); Furosemide (Lasix®),¹¹; Torsemide (Demedex®) ADE: 3,4 • Potassium-Sparing Diuretics: Spironolactone (Aldactone®); Triamterene (Dyrenium®) ADE: 1,2,5,8
Compiled by Amy DeWein, PharmD, MHS, RPH		Rev. 8.13.13

High-Risk Medications Attributed to Falls in Older Adults

MISCELLANEOUS DRUG CLASSES	KEY	NOTICE									
<p>The following drug classes of medications are associated with an increased risk of falls, or adverse drug effects that may contribute to falls. Also reported are drug effects that may lead to serious adverse consequences if one falls. Further studies are warranted to identify specific agents in a class.</p> <p>Any medication with strong anticholinergic effects.</p> <ul style="list-style-type: none"> · Antihistamines (chlorpheniramine*, cyproheptadine*, diphenhydramine*, hydroxyzine*) · Antiemetics (prochlorperazine, promethazine) · Antivertigo agents (meclizine, scopolamine) · Urinary incontinence (oxybutynin*, propantheline, solifenacin, tolterodine, trospium) <p>Anticoagulants and Antiplatelet Agents. These drugs may increase one's risk of falling, but may increase one's risk of bleeding secondary to a fall. Extra caution should be used in treatment plans.</p> <p>Antidiabetic Agents. Can lead to hypoglycemia, which may result in lightheadedness, dizziness, and/or unsteadiness on feet, and may increase one's risk for falling.</p> <p>Acetylcholinesterase Inhibitors. Cognitive impairment is associated with an increased risk of falls; therefore, close monitoring of individuals with cognitive impairment (including those treated with acetylcholinesterase inhibitors) is important.</p> <p>Antiparkinsonian Medications. Parkinson's disease is associated with an increased risk of falls; therefore, close monitoring of individuals with Parkinson's disease (including those treated with antiparkinsonian medications) is important.</p>	<p>ADVERSE DRUG EVENT (ADE) An unwanted effect caused by the administration of a drug. The onset of the adverse reaction may be sudden or develop over time.</p> <p>Medications which cause/contribute to:</p> <ol style="list-style-type: none"> 1 = sedation/fatigue/lethargy 2 = decreased alertness 3 = postural/orthostatic hypotension 4 = dizziness 5 = decreased neuromuscular function/ataxia 6 = decreased memory/cognitive impairment 7 = blurred vision 8 = confusion 9 = arrhythmias 10 = syncope 11 = anemia <p>*=Potentially Inappropriate Medications Prescribed in Older Adults – Beer's Criteria</p> <p>Several high-risk fall medications also appear on a peer-reviewed list of medications which pose additional safety concerns in older adults called the Beer's Criteria. These medications will be designated with an asterisk (*). This evidence may be important to cite to physicians to promote change in prescribing.</p> <p style="text-align: center;">Over the Counter (OTCs) Medications and Alcohol</p> <p>OTCs bought without a doctor's prescription may contain medications identified in this reference. Medications with line extensions (i.e., Tylenol-Cold) should be checked. Common OTCs include:</p> <table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">Allergy medicines</td> <td style="padding-right: 20px;">Cold remedies</td> <td>Sleep Aids</td> </tr> <tr> <td>Antinauseants</td> <td>Cough preparations</td> <td>Herbals</td> </tr> <tr> <td>Analgesics</td> <td>Muscle relaxants</td> <td></td> </tr> </table> <p>Liquid medications may contain ethanol. Avoiding alcohol when taking medication is the best practice. Alcohol is a substance commonly used by seniors, which alone can lead to the impairment and CNS depression.</p>	Allergy medicines	Cold remedies	Sleep Aids	Antinauseants	Cough preparations	Herbals	Analgesics	Muscle relaxants		<p>This reference tool includes medications and drug classes from fall risk research among older adult populations; and therefore, is not a complete drug information resource. ADEs listed are general class and therapeutic category effects.. Pharmacists should consult additional reference for drug--specific ADEs and % of incidence..</p> <p>This information is compiled for use by Missouri Pharmacists partnering in the Show Me Falls Free Missouri initiative; a statewide Missouri Fall Prevention Coalition.</p> <p>Vision of the Coalition: Missouri older adults will have fewer falls and fall-related injuries, maximizing their independence and quality of life, while decreasing healthcare costs and deaths.</p> <p>"No risk factor for falls is as potentially preventable or reversible as medication use." (Leipzig, Cumming, and Tinetti 1999)</p> <div style="text-align: center; margin-top: 20px;">  <p>MPA MISSOURI PHARMACY ASSOCIATION www.MORx.com</p> </div>
Allergy medicines	Cold remedies	Sleep Aids									
Antinauseants	Cough preparations	Herbals									
Analgesics	Muscle relaxants										

Pharmacist Key Points in Medication Review for Fall Prevention

- Identify medication side effects, adverse effects and toxicities which may increase the risk for falling. Consider effects may be additive.
- Psychoactive/psychotropic polypharmacy greatly increases fall risk; carefully inventory and recommend reduce, taper, and/or to discontinue medications that may be associated with falls and that do not cause adverse withdrawal events.
- Do not abruptly stop medications. Tapering doses drug by drug, one at a time is recommended. An anecdotal rule of thumb is 10%-25% of the daily dose every week to 2 weeks depending on the half-life of the drug. The longer the half-life, the longer the tapering period may be (i.e. diazepam and fluoxetine have half-lives of the parent drug and active metabolite that exceed 150 hours.)
- Consider PRN medications as a possible cause if a fall occurred within one week of use and the medication were longer-acting benzodiazepine (e.g. diazepam) or antipsychotics.
- Psychoactives or central nervous system (CNS)-active agents include psychotropics and the prokinetic agent metoclopramide, narcotic or opioid analgesics, antiparkinson agents, anticonvulsants, muscle relaxants, antihistamines, and centrally acting hypertensives.
- Consider reporting to physician if further assessment is needed for diagnosis or better control of: anemia, depression, osteoporosis, and glycemic control. Do note recommendations for needed footcare (especially if peripheral neuropathy is suspected)/new footwear, or if the patient has a fear of falling.
- Falls Prevention Guidelines state Vitamin D supplements of at least 800 IU per day should be considered for people with suspected or known vitamin D deficiency, or who are otherwise at increased risk for falls.

References:

1. Ferreri, S et al. Methodology of an ongoing, randomized controlled trial to prevent falls through enhanced pharmaceutical care. Am J Geriatr. Pharmacother. 2008;6:61-81.
2. Leipzig RM, Cumming RG, Tinetti ME. Drugs and falls in older people: A systematic review and meta-analysis I. Psychotropic drugs. J Am Geriatr Soc. 1999;47:30-39.
3. Leipzig RM, Cumming RG, Tinetti ME. Drugs and falls in older people: A systematic review and meta-analysis: II. Cardiac and analgesic drugs. J Am Geriatr Soc. 1999;47:40-50.
4. Cooper JWC, Burfield AH. Medication interventions for fall prevention in the older adult. Pharmacy Today. 2009(May);15(5):34-48.
5. Moylan KC, Binder EF. Falls in older adults: Risk assessment, management, and prevention. Am J Med. 2007;120:493.
6. Beers MH. Explicit criteria for determining potentially inappropriate medication use by the elderly. An update. Arch Intern Med. 1997;157:1531-1536.
7. Fick DM, Cooper JW, Wade WE et al. Updating the Beers criteria for potentially inappropriate medication use in older adults. Arch Intern Med. 2003;163:2716-2724.
8. Williams CM. Using medications appropriately in older adults. Am Fam Physician. 2002;66:1917-1924.
9. Zhan C, Sangl J, et al. Potentially inappropriate medication use in the community-dwelling elderly: Findings from the 1996 Medical Expenditure Panel Survey. JAMA. 2001;286:2823-2829.
10. Knight EL, Avorn J. Quality indicators for appropriate medication use in vulnerable elders. Ann Intern Med. 2001;135:703-710.
11. AGS/BGS 2010 Falls Prevention Guidelines <http://www.medcats.com/FALLS/frameset.htm>

Other Sources: Additional sources available upon request.

1. Cameron, KA. Medications that may cause/contribute to falls. American Society Consultant Pharmacists/Med-Pass 05/05.