



Care homes - Medication and falls

Falls and fall-related injuries are a common and serious problem for older people. People aged 65 and older have the highest risk of falling, with 30% of people older than 65 and 50% of people older than 80 falling at least once a year.¹

The impact of falls may include:

- Fractures of the hip, femur, humerus, wrist and rib
- Soft tissue injuries
- Haematoma
- Transient confusion
- Social/psychological consequences (loss of independence, loss of confidence, limited social and physical activity)
- Sudden ageing
- Hospitalisation and immobilisation
- Disability
- Death.

This resource pack has been produced to raise awareness amongst healthcare professionals of the medicines that can increase the risk of falls in older people. The aim is that they are taken into consideration when conducting medication reviews and also when deciding whether to initiate medicines if the patient is a known faller or at risk of falls.

The information is divided into:

- A medicines and falls risk classification document and key information sheet for GPs (attachments 1& 2).
- An information sheet for care home staff (attachment 3).
- A falls risk questionnaire which is intended to gather valuable information that should be shared with a healthcare professional with appropriate skills and experience in falls risk assessment. It can be adapted to reflect the local referral process (attachment 4).

Points to note

- Falls are multifactorial and a fall should not be looked at in isolation.
- All healthcare professionals dealing with patients known to be at risk of falling should develop and maintain basic professional competence in falls assessment and prevention.
- Falls assessment should be performed by a healthcare professional with appropriate skills and experience, normally in the setting of a specialist falls service.

How medicines can cause falls

In theory any medicine that causes one of the following effects can increase the risk of falling.



Sedation, drowsiness



Impaired postural stability



Hypoglycaemia



Hypothermia



Confusion



Dehydration



Vestibular damage (tinnitus, deafness)



Visual impairment (blurred vision, dry eyes)



Orthostatic hypotension



Drug induced Parkinsonism

There are two classes of drugs that have the highest propensity to cause falls, those acting on the brain and those acting on the heart and circulation.

Drugs acting on the brain (psychotropic drugs)

There is good evidence that stopping psychotropic drugs can reduce falls.²

Taking a psychotropic medicine approximately doubles the risk of falling. There is no data on the effect of taking two or more psychotropic medicines at the same time.³

Sedatives, antipsychotics and sedating antidepressants cause drowsiness and slow reaction times. Some antidepressants and antipsychotics also cause orthostatic hypotension.

Drugs acting on the heart and circulation

Maintaining consciousness and an upright posture requires adequate blood flow to the brain. This requires an adequate pulse and blood pressure. In older people a systolic blood pressure of 110mmHg or below is associated with an increased risk of falls. Any drug that reduces the blood pressure or slows the heart can cause falls (or feeling faint or loss of consciousness or "legs giving way").⁴ In some patients the cause is clear – they may be hypotensive, or have a systolic drop on standing. Others may have a normal blood pressure lying and standing, but have syncope or pre-syncope from carotid sinus hypersensitivity or vasovagal syndrome. Stopping cardiovascular medication reduces syncope and falls by 50%, and reduces the prevalence of these four syndromes.^{5,6}

Falls may be due to recent medication changes, but are usually caused by medicines that have been given for a long time without appropriate review. Attachment 1 is a falls risk classification document which grades psychotropic drugs and drugs acting on the circulation according to their effects on falls risk. it can be used by GPs and pharmacists to support medication review.

References

- 1. Falls: assessment and prevention of falls in older people. NICE Clinical Guideline 161. June 2013. Available at http://www.nice.org.uk/Guidance/CG161.
- 2. Campbell AJ, Robertson MC, Gardner MM, et al. Psychotropic medication withdrawal and a home-based exercise program to prevent falls: a randomized, controlled trial. J Am Geriatr Soc 1999; 47: 850–3.
- 3. Darowski A, Chambers SCF and Chambers DJ. Antidepressants and falls. Drugs and Aging 2009; 26 (5): 381-394.

- 4. Darowski A and Whiting R. Cardiovascular drugs and falls. Reviews in Clinical Gerontology 2011; 21 (2): 170-179.
- 5. Van der Velde N, van den Meiracker AH, Pols HA, et al.. Withdrawal of fall-risk-increasing drugs in older persons: effect on tilt-table test outcomes. J Am Geriatr Soc 2007;55: 734–739.
- 6. Alsop K, MacMahon M. Withdrawing cardiovascular medications at a syncope clinic. Postgrad Med Journal 2001; 77: 403-5.

Information compiled by Cherise Howson, PrescQIPP Programme, October 2014 and reviewed by Katie Smith, East Anglia Medicines Information Service, December 2014.

Non-subscriber publication April 2015.

Additional PrescQIPP resources



Risk classification guide, guide to medication and falls for GPS/care home staff, falls risk questionnaire

Available here: http://www.prescqipp.info/resources/viewcategory/307-care-homes-medication-and-falls

Attachment 1: Medication and falls risk classification guide

The tables below have been adapted from the Medicines and Falls in hospital: Guidance Sheet produced by John Radcliffe Hospital, Oxford, March 2011.

This is available as a seperate document (attachment 1). Visit:

http://www.prescqipp.info/resources/viewcategory/307-care-homes-medication-and-falls

Drugs acting on the brain (psychotropic drugs)

HIGH RISK OF FALLS EITHER ALONE OR IN COMBINATION				
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP	EFFECTS ON FALLS RISK		
Sedatives: Benzodiazepines	Temazepam, nitrazepam, diazepam, lormetazepam, chlordiazepoxide, flurazepam, lorazepam, oxazepam, clonazepam	 Drowsiness, slow reactions, impaired balance. Caution in patients who have been taking them long term. 		
Sedatives: "Zs"	Zopiclone, zolpidem	Drowsiness, slow reactions, impaired balance.		
Sedating antidepressants (tricyclics and related drugs)	Amitriptyline, dosulepin, imipramine, doxepin, clomipramine, lofepramine, nortriptyline, trimipramine, mirtazapine, mianserin, trazodone	 All have some alpha blocking activity and can cause orthostatic hypotension. Antidepressants can cause drowsiness, impaired balance and slow reaction times. Doubles the rate of falling. 		
Monoamine oxidase inhibitors (MAOIs)	Phenelzine, isocarboxazid, tranylcypromine	MAOIs are now rarely used; all (except moclobemide) cause severe orthostatic hypotension.		
Drugs for psychosis and agitation	Chlorpromazine, haloperidol, fluphenazine, risperidone, quetiapine, olanzapine	 All have some alpha - receptor blocking activity and can cause orthostatic hypotension. Sedation, slow reflexes, loss of balance. 		
Serotonin and norepinephrine reuptake inhibitor (SNRI) antidepressants	Venlafaxine, duloxetine	As for selective serotonin reuptake inhibitor (SSRI) antidepressants (see table on page 5) but also commonly cause orthostatic hypotension (through noradrenaline re-uptake blockade).		
Opiate analgesics	All opiate and related analgesics, e.g. codeine, morphine, tramadol	Sedation, slow reactions, impair balance, cause delirium.		
Anti-epileptics	Phenytoin	 Phenytoin may cause permanent cerebellar damage and unsteadiness in long term use at therapeutic dose. Excess blood levels cause unsteadiness and ataxia. 		
	Carbamazepine, phenobarbitone	Sedation, slow reactions. Excess blood levels cause unsteadiness and ataxia.		
Parkinson's disease (PD): Dopamine agonists	Ropinirole, pramipexole	May cause delirium and orthostatic hypotension.		

HIGH RISK OF FALLS EITHER ALONE OR IN COMBINATION			
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP	EFFECTS ON FALLS RISK	
Parkinson's disease (PD): MAOI-B inhibitors	Selegiline	 Causes orthostatic hypotension. The subject of drugs and falls in PD is difficult, as falls are so common, and orthostatic hypotension is part of the disease. In general only definite drug related orthostatic hypotension would lead to a change in medication. 	

MEDIUM RISK OF FALLS ESPECIALLY IN COMBINATION				
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP	EFFECTS ON FALLS RISK		
Selective serotonin reuptake inhibitor (SSRI) antidepressants	Sertraline, citalopram, paroxetine, fluoxetine	 Cause falls as much as other antidepressants in population studies. Several population studies have shown that SSRIs are consistently associated wit an increased rate of falls and fractures, but there are no prospective trials. The mechanism of such an effect is unknown. They cause orthostatic hypotension and bradycardia only rarely as an idiosyncratic side effect. They do not normally sedate. They impair sleep quality. 		
Muscle relaxants	Baclofen, dantrolene	Sedative. Reduced muscle tone. No falls data on muscle relaxants. Tend to be used in conditions associated with falls.		
Anti-epileptics	Sodium valproate, gabapentin	Some data on falls association.		

POSSIBLE RISK OF FALLS PARTICULARLY IN COMBINATION				
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP	EFFECTS ON FALLS RISK		
Anti-epileptics	Lamotrigine, pregabalin, levatiracetam, topiramate	 Insufficient data to know if these newer agents cause falls. 		
Vestibular sedatives Phenothiazines	Prochlorperazine	Dopamine antagonist – may cause movement disorder in long term use. Also acts as an alpha receptor blocker and antihistamine.		
Vestibular sedatives Antihistamines	Cinnarazine, betahistine	Sedating. No evidence of benefit in long term use.		

POSSIBLE RISK OF FALLS PARTICULARLY IN COMBINATION				
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP EFFECTS ON FALLS RISK			
Sedating antihistamines for allergy	Chlorphenamine, hydroxyzine, promethazine, trimeprazine	No data, but sedation likely to contribute to falls. Long half-lives.		
Anticholinergics acting on the bladder	Oxybutinin, tolterodine, solifenacin	No data, but have known Central Nervous System (CNS) effects.		

Drugs acting on the heart and circulation

HIGH RISK OF FALLS EITHER ALONE OR IN COMBINATION				
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP	EFFECTS ON FALLS RISK		
	Doxazosin, indoramin, prazosin, tamsulosin, terazosin, alfluzosin	Used for hypertension or for prostatism in men. They commonly cause severe orthostatic hypotension. Stopping them may precipitate urinary retention in men.		
Alpha receptor blockers	Sedating antidepressants	 See 'sedating antidepressants' in the 'drugs acting on the brain' table (page 4). Orthostatic hypotension. 		
	Drugs for psychosis and agitation	 See 'drugs for psychosis and agitation' in the 'drugs acting on the brain' table (page 4). Orthostatic hypotension. 		
Centrally acting alpha 2 receptor agonists	Clonidine, moxonidine	May cause severe orthostatic hypotension.Sedating.		
Thiazide diuretics	Bendroflumethiazide, chlorthalidone, metolazone	 Cause orthostatic hypotension, weakness (muscle and general) due to low potassium. Hyponatraemia. 		
Angiotensin converting enzyme	Lisinopril, ramipril, enalapril, captopril, perindopril	These drugs rely almost entirely on the kidney for their elimination and can accumulate in dehydration or renal failure.		
inhibitors (ACEIs)	Fosinopril, trandolapril, quinapril	Excreted by liver and kidney.		

HIGH RISK OF FALLS EITHER ALONE OR IN COMBINATION			
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP	EFFECTS ON FALLS RISK	
Beta blockers	Atenolol, sotalol (renally excreted, may accumulate)	Can cause bradycardia, hypotension, carotid sinus hypersensitivity, orthostatic hypotension and vasovagal syndrome.	
	Bisoprolol, metoprolol, propranolol, carvedilol, timolol eye drops	Can cause bradycardia, hypotension, carotid sinus hypersensitivity, orthostatic hypotension and vasovagal syndrome.	
	Glyceryl trinitrate (GTN)	 A common cause of syncope due to sudder drop in blood pressure. 	
Antianginals	Isosorbide mononitrate, nicorandil	Cause hypotension and paroxysmal hypotension.	

MEDIUM RISK OF FALLS ESPECIALLY IN COMBINATION			
MEDICATION GROUP	COMMONLY USED MEDICATIONS WITHIN THE GROUP	FFFFCTS ON FALLS RISK	
Loop diuretics	Furosemide, bumetanide	Dehydration causes hypotension. Low potassium (which can cause fainting and general weakness) and low sodium (which can cause sluggishness and confusion).	
Angiotensin receptor blockers (ARBs)	Losartan, candesartan, valsartan, irbesartan, olmesartan, telmisartan, eprosartan	May cause less orthostatic hypotension than ACEIs.Excreted by liver and kidney.	
Calcium channel blockers that only reduce blood pressure	Amlodipine, felodipine, nifedipine, lercanidipine	Cause hypotension and paroxysmal hypotension.	
Calcium channel blockers which slow the pulse and reduce blood pressure	Diltiazem, verapamil	May cause hypotension or bradycardia.	
Other antidysrhythmics	Digoxin, amiodarone, flecainide	 May cause bradycardia and other arrhythmias. Data on digoxin and falls probably spurious due to confounding by indication. 	

POSSIBLE RISK OF FALLS PARTICULARLY IN COMBINATION			
MEDICATION COMMONLY USED MEDICATIONS WITHIN THE GROUP EFFECTS ON FALLS RISK			
Acetylcholinesterase inhibitors (for dementia)	Donepezil, rivastigmine, galantamine	Cause symptomatic bradycardia and syncope.	

Note

The list is not meant to be fully comprehensive but intended to raise awareness of the types of drugs that can contribute to falls. There may be other drugs that increase the risk of falls in certain patients.

Attachment 2: Key information for GPs

This is available as a seperate document. Visit:

http://www.prescgipp.info/resources/viewcategory/307-care-homes-medication-and-falls

Medication review: Reducing the risk of falls

In patients taking medicines known to contribute to falls, medication review can play an important part in falls prevention. The aim of the review should be to modify or withdraw the drug, if this is not possible, close monitoring is required.

Key points

- Patients who have fallen are at high risk for a repeat fall. The mortality risk from a fall at age 85 is about 1% per fall.¹
- Older people (≥ 65 years of age) have altered pharmacokinetics and may be more "sensitive" to medications.
- Renal function impairment may result in accumulation of medication and increased risk of adverse reactions.
- Patients taking ≥ 4 prescription drugs, regardless of pharmacologic classification, are at an increased risk for falls.²
- There are two classes of drugs that have the highest propensity to cause falls, those acting on the brain and those acting on the heart and circulation. See attachment 1 for more information on individual drugs.
- Orthostatic hypotension is often caused by medication and leads to falls in older adults.³
- Theoretically ANY drug that causes the following effects can increase the risk of a serious outcome if an individual falls:
 - » Osteoporosis or reduced bone mineral density, e.g. long term use of steroids: Increased risk of fracture if a fall occurs.
 - » Bleeding risk e.g. anticoagulants: Increased risk of a cerebral haemorrhage if a fall occurs.

Symptomatic hypotension in systolic cardiac failure²

- Liaise with the consultant for patients with symptomatic hypotension in systolic cardiac failure and review all medicines the patient is taking.
- ACEIs and beta blocker have a survival benefit in systolic cardiac failure and should be maintained whenever possible.
- Most cardiac failure in older people is diastolic (preserved left ventricular function). ACEIs and beta blockers have little survival benefit in diastolic failure.

Key actions

- Consider intervention, especially if you have assessed the patient as high risk:
 - » Consider risk/benefit ratio: Does the benefit of the drug outweigh a possible risk of falling?
 - » Is there a safer drug or non-drug alternative?
 - » Is it possible to minimize the dose without losing the benefit of the drug?
- To screen for postural hypotension lying and standing blood pressures should be performed. (Remember to keep the instrument at the level of the patient's heart both when they are lying and when they are standing). Orthostatic hypotension is defined as a drop in BP (usually >20/10 mm

Hg) within three minutes of standing.4

- Symptomatic orthostatic hypotension can be reversed by non-pharmacological interventions. These include advice on avoiding:³
 - » Sudden head-up postural change (especially first thing in the morning)
 - » Hunger
 - » Dehydration
 - » Excessive heat
 - » Large meals especially with alcohol
 - » Straining (when passing stool)

The use of compression hosiery to increase venous return is an option for low blood pressure (in the absence of any signs of arterial disease, e.g. intermittent claudication).

If non-pharmacological interventions fail, pharmacological interventions may be required. These include use of blood pressure elevating drugs such as fludrocortisone, corrective measures such as use of slow sodium 2g-10g/day or laxatives to prevent straining.

REMEMBER

Medicines are just one of many factors that can increase the risk of falling. Others include:

- Motor problems
- Physical problems
- Environmental problems
- Cognitive problems
- Behavioural problems
- Cardiovascular problems
- Neurological problems.

References

- 1. Darowski A, et al. Medicines and Falls in hospital: Guidance Sheet produced by John Radcliffe Hospital, Oxford, March 2011.
- Freeland KN, Thompson AN et al. Medication Use and Associated Risk of Falling in a Geriatric Outpatient Population. The Annals of Pharmacotherapy 2012; 46 (9):1188-1192. Available at http://www.medscape.com/viewarticle/770401_4
- Dutta R. Falls in older people. Guidelines in Practice 2014; 17(6) 52-59. Available at http://www.eguidelines.co.uk/eguidelinesmain/gip/vol_17/jun_14/dutta_muscu_jun14.php#. U7sYvtJdXBY
- 4. Lahrmann H, Cortelli P, Hilz M, et al. Orthostatic hypotension. In: Gilhus NE, Barnes MP, Brainin M, editor(s). European handbook of neurological management. 2nd ed. Vol. 1. Oxford (UK): Wiley-Blackwell; 2011. p. 469-75
 - http://www.eaneurology.org/fileadmin/user_upload/guidline_papers/EFNS_guideline_2011_Orthostatic_hypotension.pdf

Attachment 3: Key information for care home staff

This is available as a seperate document. Visit:

http://www.prescgipp.info/resources/viewcategory/307-care-homes-medication-and-falls

Medication and falls: Key information for care home staff

In patients taking medicines known to contribute to falls, medication review can play an important part in falls prevention. The aim of the review should be to modify or withdraw the drug, if this is not possible close monitoring is required.

Key points

- Residents who have fallen are at high risk for a repeat fall. The mortality risk from a fall at age 85 is about 1% per fall.¹
- Older people (≥ 65 years of age) may be more "sensitive" to medications.
- Residents taking ≥ 4 prescription drugs, regardless of type of drug, are at an increased risk for falls.²
- Falls may be due to recent medication changes, but are usually caused by medicines that have been given for a long time without appropriate review
- Orthostatic hypotension (sudden drop in blood pressure when they move from a lying down or sitting position to sitting or standing) is often caused by medication and leads to falls in older adults.³
- Residents at high risk of falling (e.g. with recurrent, unexplained or injurious falls) should be considered for specialist referral and multidisciplinary intervention.

In theory any medicine that causes one of the following effects can increase the risk of falling



Sedation, drowsiness



Impaired postural stability



Hypoglycaemia



Hypothermia



Confusion



Dehydration



Vestibular damage (tinnitus, deafness)



Visual impairment (blurred vision, dry eyes)



Orthostatic hypotension



Drug induced Parkinsonism

Remember

The more risk factors a resident has, the more likely they are to fall. Medication is only one risk factor; others include:

- Motor problems
- Physical problems, e.g. not using mobility aids correctly
- Environmental problems, e.g. poor footwear
- Cognitive problems, e.g. poor memory resulting in trying to walk unaided

- Behavioural problems
- Cardiovascular problems
- Neurological problems.

Key actions

- Prompt medication review for any resident who has an acute fall, to identify and review any
 medicines that may be contributing to their risk of falls.
- If there are any changes to a resident's mobility, balance, coordination or alertness inform the GP as this increases their risk of falls.
- To avoid orthostatic hypotension encourage the resident to:³
 - » Avoid sudden postural change, especially when getting up in the morning.
 - » Increase their non-caffeinated fluid intake to > 2 litres a day (about 3 litres if they weigh more than 75kg) where appropriate, some residents may be on a fluid restricted diet.
 - » Eat several small meals a day.
 - » Drink caffeine on rising and after meals.
 - » Lie propped up at night with a head up tilt of 15° 20° (pillow height 20cm 30cm).

References

- 1. Darowski A, et al. Medicines and Falls in hospital: Guidance Sheet produced by John Radcliffe Hospital, Oxford, March 2011.
- 2. Freeland KN, Thompson AN et al. Medication Use and Associated Risk of Falling in a Geriatric Outpatient Population. The Annals of Pharmacotherapy 2012; 46 (9):1188-1192. Available at http://www.medscape.com/viewarticle/7704014
- 3. Dutta R. Falls in older people. Guidelines in Practice 2014; 17(6) 52-59. Available at http://www.eguidelines.co.uk/eguidelinesmain/gip/vol_17/jun_14/dutta_muscu_jun14.php#. U7sYvtJdXBY

Attachment 4: Falls risk questionnaire

Name of resident

Date of birth

This is available as an adaptable Word document, attachment 4. Visit: http://www.prescgipp.info/resources/viewcategory/307-care-homes-medication-and-falls

FALLS RISK QUESTIONNAIRE

The questions below are intended to gather valuable information that should be shared with a healthcare professional with appropriate skills and experience in falls risk assessment.

Care nome			
Name of person completing form			
Date form completed			
Has the resident had a fall in the l	ast year?	Yes	No
If yes, how many times?			
Has this impacted on their mobilit activities?	y or daily	Yes	No
Does the resident have any difficumobility or impaired balance?	lties with	Yes	No
Does the resident have a fear of fa	alling?	Yes	No
Does the resident have any visual problems?		Yes	No
Is the resident cognitively impaired?		Yes	No
Does the resident have behaviour	al problems?	Yes	No
Does the resident have any health can increase their risk of falling*?		Yes	No
If yes, please list the health proble	ems		
Please list all the medicines the re regular and when required (it wou MAR chart).			-

^{*} Health problems such as orthostatic hypotension (sudden drop in blood pressure when they move from a lying down or sitting position to sitting or standing), Parkinson's disease, diabetes.