

TOPIC 8



HEALTH QUALITY & SAFETY
COMMISSION NEW ZEALAND
Kupu Taurangi Hauora o Aotearoa

Medicines: balancing intended benefits and increased falls risk

How you can use Topic 8	1
Key messages in Topic 8	2
What Topic 8 covers	2
How older people, polypharmacy and adverse drug events are related	2
How medicines increase the risk of falls	3
How modifying medicine use might reduce falls and related harm	6
60 minutes of professional development	8
Recommended reading	9
Additional resources	9
Resources about medicines optimisation review	9
Professional development: questions to test your knowledge	10
References	11

How you can use **Topic 8**

Use **Topic 8** as:

- an information resource that explains the evidence and rationale for critically thinking about any medicines an older person is taking that increase their risk of falling
- an introduction to medicines optimisation review to help avoid inappropriate prescribing
- a 60-minute professional development exercise (see [60 minutes of professional development](#) in this resource).

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Key messages in Topic 8

- Medicines have many physiological effects that can increase the risk of an older person falling. The risk of falls can increase if the older person's medicines are not reviewed regularly to ensure the medication is right for them as their health condition, physiology, routine or lifestyle changes.
- Some medicines are associated with increasing the risk that an older person will fall or suffer falls-related injuries. Also, adverse drug events are recognised causes of hospitalisation, morbidity and mortality.
- We should do four things if an older person is taking medicines that increase their risk of falling: (1) regularly review the reasons for prescribing the medicine and its continuation; (2) educate older people and their families/whānau about the risks associated with medicines; (3) put in place individualised strategies to prevent an older person falling and (4) emphasise why a medical review of the older person is important after even a minor fall.
- Falls are reduced by reviewing the medicines an older person is taking and modifying therapy to balance benefits of the medicines and risks of falling. See [page 6 of this document](#) for an explanation of 'medicines optimisation review'. Medicines optimisation review is explained [here](#).



What Topic 8 covers

Some medicines are associated with increased falls and falls-related injuries in older people, but particular approaches for reviewing and modifying medicine use can reduce falls. We need to balance the benefit of using a medicine against the risks of taking it. So which medicines should we consider?

Topic 8 provides an overview of medicines associated with an increased risk of falling or falls-related harm and looks at how reducing or changing the use of the medicines can reduce falls. The required reading covers general considerations in [managing medicines in older people](#) and [stopping medicines](#) as part of medicines optimisation review and modification.



How older people, polypharmacy and adverse drug events are related

Polypharmacy: Polypharmacy is often defined as taking four or five medicines (or more) concurrently (Patterson et al 2012).

In clinical practice the question needs to be addressed on an individual basis because it is specific to each older person:

Are there many medicines (appropriate polypharmacy to manage complex comorbidities) or **too many** medicines (inappropriate or problematic polypharmacy) (Cooper et al 2015)?

Polypharmacy is associated with falls and falls-related fractures (Narayan and Nishtala 2015; Pan et al 2014; Richardson et al 2014).

HOW OLDER PEOPLE, POLYPHARMACY AND ADVERSE DRUG EVENTS ARE RELATED *Continued*

Inappropriate polypharmacy can result from:

- a prescribing cascade, when one medicine is added to combat the unwanted effects of another medicine
- failure to review medicines as an older person's clinical condition, physiology or treatment goals change.

Adverse drug events (ADEs): ADEs, broadly undesirable experiences associated with medicines, cover falls and falls-related injuries. ADEs include injuries causally linked to a medicine (or lack of an intended medicine), drug interactions, adverse drug reactions (side effects) and harm from medication errors (Zolezzi and Parsotam 2005).

In older people, ADEs are recognised causes of hospitalisation, morbidity and mortality (Petrovic et al 2012). In particular:

- the risk of ADEs increases as a person ages and their physiology and metabolism change, and they experience general functional and cognitive decline, meaning drugs affect them in different ways (Petrovic et al 2012)
- the potential for ADEs increases with the number of medicines being taken: 13 percent of older people taking two medicines suffer an ADE, increasing to 58 percent when taking five medicines and 82 percent when taking seven or more medicines (Patterson et al 2012)
- just one inappropriate medicine can place an older person at risk of an avoidable ADE (Beers and Ouslander 1989).

Many medicines are known to increase the risk of falls, and a New Zealand study demonstrated the association between the use of potentially inappropriate medicines (PIMs) and falls. Polypharmacy, defined here as taking more than five medicines, was also associated with falls, as noted in New Zealand health data sets (Narayan and Nishtala 2015). ♦



How medicines increase the risk of falls

The risk of falls can increase if medicines are not reviewed regularly to ensure therapeutic safety as an older person's health condition, physiology, routine or lifestyle changes. Medicines can increase the risk of an older person falling due to the effects of medicines on their blood pressure, gait/movement, cognition and toileting routine.

Blood pressure: Medicines that cause hypotension (whether as an intended therapeutic effect or an ADE) increase the risk of falls (Butt et al 2013; de Groot et al 2013). Postural hypotension (resulting from a reduction in blood flow to the brain in people whose blood pressure drops on standing) can cause light-headedness, dizziness and syncope (fainting). Older people are particularly susceptible to falls related to postural hypotension. This is because compensatory systems in the body, which help to regulate changes in posture, decline with age. For example, serious falls appear to increase over the short term when an older person starts taking, or increases, their use of anti-hypertensive medicines (Shimbo et al 2016).

Gait/movement: Medicines that adversely affect balance, hearing, vision, coordination and muscle tone can disrupt an older person's normal and coordinated gait and movement. This increases their risk of falling (de Groot et al 2013).

HOW MEDICINES INCREASE THE RISK OF FALLS *Continued*

Cognition: Medicines that change or impair perception (including sedatives) increase the risk that an older person will fall. This is because such medicines affect a person's coordination and reduce their ability to identify hazards.

Toileting routine: The use of diuretics and laxatives can lead to a person needing to use the toilet urgently. This urgency may make an older person try to get up and move more quickly than is safe for them.

Managing those risks

Certain medicines are associated with an increased risk of falls and increased harm (see next page). This means we should do four things when an older person is prescribed these medicines (Landi et al 2005).

1. Regularly review the reasons for prescribing the medicine and continuing its use. Consider **de-prescribing** medicines (Klotz 2009).
2. Educate the older person and all those involved in their care (family/whānau, caregivers and staff) about the risks associated with these medicines, particularly when the older person starts taking the medicines or increases the dose.
3. Ensure strategies to prevent the older person from falling are appropriate and individualised to them. For example, **assess the older person's environment and make it as safe as possible**. Also make sure **appropriate intervention strategies** have addressed any **risk factors identified in a full assessment** of the older person.
4. Tell the older person, their family/whānau and/or their caregivers about the importance of **seeking medical attention and assessment after even a minor fall** to check whether any medicines they are taking contributed to the fall. ♦

Psychotropics increase falls in older people by up to 47 percent (Landi et al 2005)

HOW MEDICINES INCREASE THE RISK OF FALLS *Continued*

Medicines that increase the risk of falling					Medicines that increase the risk of injury
PSYCHOTROPICS	MEDICINES WITH ANTICHOLINERGIC EFFECTS	ANTIHYPERTENSIVES AND DIURETICS	ANTI-EPILEPTICS	OPIOIDS	ANTICOAGULANTS
<p>Psychotropics increase falls in older people by up to 47 percent (Landi et al 2005). They do so by causing sedation and postural hypotension, and causing or worsening impairments in movement and cognition.</p> <ul style="list-style-type: none"> Falls risk increases with higher doses and additional psychotropics (Sano et al 2012). Risk appears greatest in the first three days after the person starts, or increases the dose of, their medicine (Echt et al 2013), but the risk continues while the older person is being treated. <p>Anti-psychotics (eg, risperidone, quetiapine, haloperidol) are often used to treat behavioural and psychological symptoms of dementia (BPSD). Dementia increases the risk of an older person falling, no matter if they are taking any medicine (Allan et al 2009). Anti-psychotics further increase the risk (Hill and Wee 2012).</p> <ul style="list-style-type: none"> Anti-psychotics are similar in terms of falls risk despite different ADE profiles. (Mehta et al 2010) <p>Antidepressants (eg, citalopram, venlafaxine, amitriptyline) are used to improve mood and reduce anxiety. Antidepressants increase the risk of the older person falling (Woolcott et al 2009) and also increase the risk of fracture. This is likely due to the role that serotonin plays in bone metabolism (Iaboni and Flint 2013).</p> <ul style="list-style-type: none"> Fracture risk is highest in the first two weeks of therapy, but increased risk continues throughout treatment (Iaboni and Flint 2013) – with higher doses linked to increased fracture rates (Vestergaard et al 2013). Antidepressant use is associated with recurrent falls (Marcum et al 2016), although the causal role of these medicines is quite controversial (Gebara et al 2015). The question is, do depressed people fall? Or do antidepressants make people fall? <p>Hypnotics and sedatives (eg, benzodiazepines such as diazepam, lorazepam, triazolam; zopiclone), used to treat anxiety or insomnia, increase the risk of a fall, especially in older people with cognitive impairment or who have fallen previously (Gallagher et al 2008).</p> <ul style="list-style-type: none"> Both long-acting and short-acting agents increase the risk of falling (Landi et al 2005). Hypnotics have only a small and limited positive effect in improving sleep (Glass et al 2005). <p>MANAGING THE BALANCE BETWEEN BENEFIT AND RISK</p> <ul style="list-style-type: none"> Start using psychotropics only if the benefits outweigh potential risks. Use the lowest dose possible, for the shortest duration. Review therapy regularly; when using psychotropics for BPSD, taper down and/or stop as soon as possible. Educate both caregivers (Fossey et al 2006) and the older person (Salonja et al 2010) about the adverse effects of using psychotropics. Reducing a dose or stopping use might not cause any behavioural issues to re-emerge. 	<p>Numerous medicines have anticholinergic activity which is often distinct from their therapeutic mechanism of action. Such medicines include antipsychotics, tricyclic antidepressants, antispasmodic agents (eg, oxybutynin and hyoscine) and sedating antihistamines. Anticholinergic activity increases the risk of ADEs, including falls (Berdot et al 2009) by causing cognitive impairment, delirium and postural hypotension.</p> <ul style="list-style-type: none"> Anticholinergic burden differs within classes, and those with a lower burden have fewer ADEs (Rudolph et al 2008). <p>MANAGING THE BALANCE BETWEEN BENEFIT AND RISK</p> <ul style="list-style-type: none"> Avoid medicines with anticholinergic activity or choose an alternative agent where possible. Choose a medicine with a lower anticholinergic burden (eg, nortriptyline has less anticholinergic activity than amitriptyline). 	<p>Antihypertensives (eg, metoprolol, felodipine, cilazapril) are used to treat hypertension, ischaemic heart disease and atrial fibrillation, and for secondary prevention of cardiovascular disease.</p> <p>Diuretics are used to reduce fluid retention (eg, furosemide) and/or reduce blood pressure (eg, bendrofluzide).</p> <p>All classes of antihypertensives and diuretics have been shown to increase the risk of falls (Gribbin et al 2011; Tanaka et al 2008). Risk is greatest in the first 1–2 weeks from the start of the medicine or from its increase in dose (Berry et al 2012; Butt et al 2013; Gribbin et al 2011).</p> <ul style="list-style-type: none"> Newly initiated antihypertensives increase the chance of a fall leading to injury by up to 69 percent during the first 45 days of treatment and also increase the risk of hip fracture by 43 percent during this time (Butt et al 2013). <p>MANAGING THE BALANCE BETWEEN BENEFIT AND RISK</p> <ul style="list-style-type: none"> Check whether therapy continues to be clinically indicated (eg, earlier angina or an earlier oedema may no longer exist or trouble the older person). Perform lying and standing blood pressure checks to exclude postural hypotension and/or educate the older person in how to manage it. Check the older person's blood pressure routinely, and reduce the dose of medicine if their blood pressure is consistently below normal limits. Blood pressure targets for older people may be higher than those for younger people. However, the impact of blood pressure goals on falls may be slight. 	<p>Anti-epileptics (eg, phenytoin, carbamazepine, valproate sodium, gabapentin) are used to control seizures, stabilise moods and control neuropathic pain.</p> <p>Anti-epileptics increase the risk of falls, in addition to the increased risk associated with epilepsy (Ahmad et al 2012) by causing dizziness, ataxia and unsteady gait (Carbone et al 2010).</p> <ul style="list-style-type: none"> Anti-epileptics change bone metabolism, and reduced bone mineral density increases the likelihood of falls-related fractures (Ahmad et al 2012). The risk of fracture increases with enzyme-inducing anti-epileptics (eg, phenytoin, carbamazepine) and multiple anti-epileptics (Carbone et al 2010) and longer duration of use (Ahmad et al 2012). <p>MANAGING THE BALANCE BETWEEN BENEFIT AND RISK</p> <ul style="list-style-type: none"> Review the anti-epileptic therapy regularly, especially if it is being used for non-seizure-related indications. Discuss stopping anti-epileptic therapy with the older person if they are not driving, are free of seizures, and are taking only one anti-epileptic medicine. 	<p>Opioids (eg, morphine, tramadol, codeine, oxycodone, fentanyl) are used to manage moderate to severe pain. Opioids can increase the risk of falls by inducing postural hypotension, sedation and dizziness (Gallagher et al 2008).</p> <ul style="list-style-type: none"> Opioids increase the risk of an older person falling, but this risk needs to be balanced against the benefit of providing adequate and appropriate analgesia (O'Neil et al 2012). <p>MANAGING THE BALANCE BETWEEN BENEFIT AND RISK</p> <ul style="list-style-type: none"> Balance the risks against the benefits of treating pain. Taper down and stop the opioids as soon as possible when used to manage acute pain (eg, after a fracture). For severe pain, administer paracetamol regularly in addition to opioids. Use non-pharmacological methods of pain relief where possible (eg, massage, orthotics and heat packs). 	<p>Anticoagulants (eg, warfarin, dabigatran) are used to reduce the risk of blood clots. They increase the risk of bleeding in falls-related injuries.</p> <ul style="list-style-type: none"> Among older people hospitalised after a fall, haemorrhage is more common in those on long-term anticoagulants compared with non-users (Pieracci et al 2007). However, warfarin treatment for atrial fibrillation is under-prescribed (by about 50 percent) for older people, and risk of falling is the most commonly cited reason for not prescribing. Even in older people at risk of falling, the benefits of warfarin can outweigh the potential risk of falls-related bleeding (Garwood and Corbett 2008). <p>MANAGING THE BALANCE BETWEEN BENEFIT AND RISK</p> <ul style="list-style-type: none"> Educating older people and their caregivers about anticoagulation helps to reduce the risk of bleeding risk (Garwood and Corbett 2008). <p>PROTON PUMP INHIBITORS</p> <p>Proton pump inhibitors (PPIs) (eg, pantoprazole, omeprazole) are acid-suppressive medicines commonly prescribed to treat conditions such as gastro-oesophageal reflux (GORD).</p> <p>Emerging evidence suggests an increased risk of fracture, although the risk mechanism is unclear (Yu et al 2011).</p> <p>MANAGING THE BALANCE BETWEEN BENEFIT AND RISK</p> <ul style="list-style-type: none"> Review the use of PPIs regularly: often short courses (6–8 weeks) are sufficient to treat GORD or an ulcer. Stop PPIs prescribed to prevent potential medicine-induced bleeding (eg, related to warfarin, ibuprofen) when the original medicine is stopped.



How modifying medicine use might reduce falls and related harm

A medicines optimisation review is a process designed to optimise the benefits of medicines and help prevent a person being harmed. The review complements **medicines reconciliation**, which aims to communicate a correct and current list of a person's medicines. This is particularly important at transitions in the person's care.

How the medicines optimisation review process works

The medicines optimisation review process involves assessing a person's medicines to:

- consider appropriateness to the person's goals of therapy and self-management (Geurts et al 2012)
- identify risks that the medicines may pose for the older person to prevent harm occurring
- identify and reduce or stop inappropriate medicines: **de-prescribing** is a planned process of **stopping medicines** that may no longer be of benefit or may be causing harm
- identify medicines (or non-pharmacological alternatives) that would be beneficial
- ensure the person is being appropriately monitored (such as checking blood pressure and arranging laboratory tests) and act on the results of that monitoring
- use medicines optimisation review in conjunction with **asking the person if they have slipped, tripped or fallen lately**.

A useful tool is **Screening Tool of Older Persons Prescriptions (STOPP) START Screening Tool to Alert Doctors to Right Treatment** criteria (O'Mahony et al 2014). Another source that lists potentially inappropriate medication in older people is the updated American Geriatrics Society Beers Criteria (American Geriatrics Society 2015 Beers Criteria Update Expert Panel 2015). Best Practice Advocacy Centre New Zealand (bpac^{nz}) gives guidance on the **practicalities of stopping medicines in older people**.

How reviewing and modifying medicine use can help to reduce falls

Reviewing and modifying medicines can reduce the older person's chance of suffering harm and inappropriate prescribing (Patterson et al 2012). The review process is part of good care for older people (Gillespie et al 2012; Huang et al 2012). Examples are noted below.

- Medicines optimisation review for older people living in the community reduces the use of prescription of medicines that increase the risk of falls (Blalock et al 2010; Weber et al 2008).
- A medicines optimisation review programme significantly reduced the number of falls by older people living in the community. In such a programme, GPs received one-on-one education from clinical pharmacists (Pit et al 2007). Gradually stopping people from taking psychotropic medication regularly also reduced falls (Campbell et al 1999).
- Medicines optimisation review by clinical pharmacists, which involved the older person and their carer, reduced the rate of falls in aged residential care facilities (Zermansky et al 2006).
- The rate of falls per patient was found to be lower following medicines optimisation review in a meta-analysis of randomised controlled trials (Huiskes et al 2017).
- Importantly, variations in how medicines optimisation review (using the STOPP/START screening tool) is implemented may determine its effectiveness. Only one of three randomised control trials showed a reduction in falls in one meta-analysis (Hill-Taylor et al 2016). In this study a physician applied the criteria directly. In other studies the physician received the recommendations from others. It may be that clear communication practices could improve the results.

Targeting and modifying falls risk-increasing medicines reduces falls (Huang et al 2012; Gillespie et al 2012)

HOW MODIFYING MEDICINE USE MIGHT REDUCE FALLS AND RELATED HARM *Continued*

Reviewing an older person's use of medicines – and modifying use as required – is especially important after a fall because medicines that increase falls are often not stopped, even when the older person has fallen.

Any medicine that changes or impairs cognition, vision, gait, balance, perception or blood pressure can increase the risk of falls, even if standard screening tools don't identify the medicine.

Stopping or reducing medicines that 'raise a red flag' may help to prevent the older person from falling. You don't need to wait until they've fallen to review their medicine use.

The Health Quality & Safety Commission's [Atlas of Healthcare Variation polypharmacy in older people domain](#) gives information about prescribing of multiple medications in older people across various district health boards (DHBs). ◆



60 MINUTES OF PROFESSIONAL DEVELOPMENT

This learning activity equals 60 minutes of your professional development.

You can add it to the personal professional record you keep to check off your competence framework requirements.

To complete this learning activity, first read the whole topic and the two required readings, then assess your learning with the **10 self-test questions**.

Learning objectives

Reading and reflecting on Topic 8 and the materials in this teaching and learning package will enable you to:

- explain the relationship between complex health conditions in older people, polypharmacy and ADEs
- describe ways to reduce or manage falls-related risks associated with certain medicines
- outline what is involved in medicines optimisation review and modification.

Teaching and learning package

Gather up the resources you'll need. Use the hyperlinks in this topic, or download or print the reference material.

Required reading

These two readings will help you form evidence-informed perspectives about how to use medicines while balancing the benefits and the risks of falls.

- 1 bpac^{nz}. 2012. Managing medicines in older people. *Best Practice Journal* 47: 6–15, via [webpage](#) or [pdf](#).
- 2 bpac^{nz}. 2010. When is enough, enough? Stopping medicines in older people. *Best Practice Journal* 27: 6–9, via [webpage](#) or [pdf](#).

RECOMMENDED READING

Mangoni AA, Jackson SH. 2004. Age-related changes in pharmacokinetics and pharmacodynamics: basic principles and practical applications. *British Journal of Clinical Pharmacology* 57(1): 6–14, via [webpage](#) or [pdf](#).

Huang AR, Mallet L, Rochefort CM, et al. 2012. Medication-related falls in the elderly: causative factors and preventive strategies. *Drugs & Aging* 29(5): 359–76 (see abstract [here](#)).

bpac^{nz}. 2014. Polypharmacy in primary care: Managing a clinical conundrum. *Best Practice Journal* 64: via [webpage](#).

ADDITIONAL RESOURCES

Ministry of Health. 2011. *Medicines Care Guides for Residential Aged Care*. Wellington: Ministry of Health, via [webpage](#) or [pdf](#).

Duerden M, Avery T, Payne R. 2013. *Polypharmacy and Medicines Optimisation*. London: The King's Fund, via [webpage](#) for summary or [pdf](#).

Consumer leaflet: [Taking your medicine safely](#).

RESOURCES ABOUT MEDICINES OPTIMISATION REVIEW

bpac^{nz}. 2010. A practical guide to stopping medicines in older people. *Best Practice Journal* 27: 10–23, via [webpage](#) or [pdf](#).

Further information on de-prescribing can be found [here](#).

See [New Zealand National Pharmacists Services Framework page 6](#) for an overview of the medicines review services that pharmacists in New Zealand provide.

American Psychiatric Association guidance on prescribing non-emergency antipsychotic medication to patients with dementia is [summarised here](#).

American Geriatrics Society 2015 Beers Criteria Update Expert Panel. 2015. [American Geriatrics Society 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults](#).

10 QUESTIONS

TOPIC 8 Professional development: questions to test your knowledge



PROFESSIONAL DEVELOPMENT ACTIVITY

ANSWER these questions to check that you have retained the knowledge reviewed in this topic and readings

1	The required reading Managing medicines in older people cites a New Zealand study finding that the number of medicines prescribed for an older patient after being admitted to hospital: decreased stayed the same increased
2	The required reading When is enough, enough? Stopping medicines in older people argues that we should give as much thought to starting medicines as to stopping them. true false
3	Mrs Jones is an 87-year-old taking the medicines listed below. A digoxin 62.5microgram daily B simvastatin 20mg daily C bendrofluazide 2.5mg daily D risperidone 500microgram nocte E warfarin as per INR Which medicines are likely to increase her risk of falls and/or injury from falling? C and D C, D and E A, D and E B, C, D and E
4	Mr Smith, a 92-year-old, was admitted to your unit a week ago and tells you he is having trouble sleeping, but does not want to take a sleeping pill. Which one of these responses would be most likely to increase his risk of falling? Ask Mr Smith about his usual bedtime routine and how you can help him make it work here. Review his daytime activities to see whether he could increase activity and reduce naps during the day. Ensure that night sedation is prescribed and persuade Mr Smith it is safe and wise to take it. Remind the night staff about the importance of a quiet night-time environment in the unit.

ANSWER

ASSESS the processes used for the review of an individual's medicine regimen in your care setting

5	In the most recent year reported (2014) in the Health Quality & Safety Commission Atlas of Healthcare Variation polypharmacy in older people domain , what was the rate of prescribing in your DHB area for people aged 75–84 for antipsychotics and benzodiazepines/zopiclone? (Click here for help with the Atlas). _____ per 1000 were prescribed an antipsychotic _____ per 1000 were prescribed a benzodiazepine or zopiclone Compared with other DHB areas, what factors could explain the similarities and differences in rates?
6	What process does your care setting use to review medicines for older patients/residents/clients? What would need to be modified (if anything) in the use of medicines in your care setting, to better balance risk and benefit for older people?
7	Describe three specific things you already do (or could do) to review and modify medicines for your patients/residents/clients? 1. 2. 3.

ASSESS

Outline three learnings or insights and how you will APPLY them in your practice

8	My first learning/insight is: I will apply it in practice by:
9	My second learning/insight is: I will apply it in practice by:
10	My third learning/insight is: I will apply it in practice by:

APPLY

LEARNER	NAME:	PROFESSION:	DESIGNATION:
DATE:	REGISTRATION ID:	WORKPLACE:	

Validation that learner has completed this professional development activity		Signature:
NAME:	PROFESSION:	CONTACT:
DATE:	REGISTRATION ID:	WORKPLACE:

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