

Appendix A: Summary of evidence from surveillance

2019 surveillance of [falls in older people: assessing risk and prevention](#) (2013) NICE guideline CG161

Summary of evidence from surveillance

Studies identified in searches are summarised from the information presented in their abstracts.

Feedback from topic experts who advised us on the approach to this surveillance review, was considered alongside the evidence to reach a view on the need to update each section of the guideline.

[Preventing falls in older people](#)

Case/risk identification

- 1.1.1.1 [Older people](#) in contact with healthcare professionals should be asked routinely whether they have fallen in the past year and asked about the frequency, context and characteristics of the fall/s. [2004]
- 1.1.1.2 Older people reporting a fall or considered at risk of falling should be observed for balance and gait deficits and considered for their ability to benefit from interventions to improve strength and balance. (Tests of balance and gait commonly used in the UK are detailed in section 3.3 of the [full guideline](#).) [2004]

Multifactorial falls risk assessment

- 1.1.2.1 Older people who present for medical attention because of a fall, or report recurrent falls in the past year, or demonstrate abnormalities of gait and/or balance should be offered a [multifactorial falls risk assessment](#). This assessment should be performed by a healthcare professional with appropriate skills and experience, normally in the setting of a specialist falls service. This assessment should be part of an individualised, [multifactorial intervention](#). [2004]
- 1.1.2.2 [Multifactorial assessment](#) may include the following:
 - identification of falls history
 - assessment of gait, balance and mobility, and muscle weakness

- assessment of osteoporosis risk
- assessment of the older person's perceived functional ability and fear relating to falling
- assessment of visual impairment
- assessment of cognitive impairment and neurological examination
- assessment of urinary incontinence
- assessment of home hazards
- cardiovascular examination and medication review. [2004]

Surveillance proposal

This section of the guideline should be updated.

Assessing falls risk

2016 surveillance summary

In previous surveillance of this guideline, no studies relevant to this section of the guideline were identified.

2019 surveillance summary

In developing the guideline in 2004, prospective cohort studies were used to identify individual risk factors associated with falling. However, in the 2013 update looking at predicting falls in hospital, only risk prediction tools were included in the evidence review. In this surveillance review, we followed the more recent approach for both community and in-hospital risk assessment. That is, we looked for tools that incorporated several risk factors, rather than at individual risk factors. Studies of tools that retrospectively assessed falls were excluded because they have more potential sources of bias and confounding than prospective studies.

We found 16 studies of tools for assessing risk of falls (see Table 1 below). The tools ranged in complexity and ability to predict falls. Most showed low to moderate ability to predict falls, often having good sensitivity or specificity but not both.

One simple tool that relied on asking older people 2 questions had sensitivity of 70% and specificity of 72% for predicting recurrent falls. The questions were:

- Have you fallen in the last 6 months?
- What is the probability that you will fall in the next few months?

Three studies assessing wearable sensors such as an accelerometer suggest that technological methods of risk prediction may be successful (AUC of up to 76% in 2 studies and sensitivity of 93% and specificity of 85% in 1 study).

Intelligence gathering

Topic experts suggested that the section on risk identification needed to explicitly include people with recent fragility

fractures and frailty because the consequences of falls may be worse in these populations. Additionally, topic experts indicated that apps for older people to undertake their own falls risk and home hazard assessments are available.

Impact statement

Although no risk assessment tools appear to adequately identify people at risk of falls, topic experts indicated a need to include frailty and previous fragility fractures as individual risk factors for falling. Identifying these populations is important because the consequences in terms of injuries and recovery after falling may be more severe. NICE's guideline on [multimorbidity](#) has a section on assessing frailty. However, there appears to be a gap in current recommendations in identifying people with a history of fractures or who are frail for falls risk assessment and interventions.

NICE has published a medtech innovation briefing on the Quantitative Timed Up and Go risk assessment tool, which combines data from wearable sensors with the existing Timed Up and Go risk assessment. The Timed Up and Go assessment records the time taken for a person to get up from a seat, walk 3 metres, then return to their seat and sit down. Thus, use of technologies to complement clinical risk assessment may be growing.

Additionally, new evidence suggests that recommendations on assessing risk of falls should be updated because several risk prediction tools are now available and technology for assessing mobility and gait has advanced substantially since the guideline was published. The update should consider whether such tools and technologies are suitable or whether other methods of case identification should be used.

New evidence identified that may change current recommendations.

Table 1 Clinical prediction tools for falls risk in people in the community

Study	n	Population	Intervention	Outcome	Result
Cattelani et al. (2015) (1)	-	Older people living in the community	FRAT-up fall risk assessment tool	Falls	AUC 64%
Chow et al. (2018) (2)	192	Older people attending the emergency department	Timed up and go	Falls	Sensitivity 71% Specificity 28% Positive predictive value 26% Negative predictive value 73%
Chow et al. (2018) (2)	192	Older people attending the emergency department	Chair test	Falls	Sensitivity 78% Specificity 23% Positive predictive value 27%

					Negative predictive value 75%
Gadkaree et al. (2015) (3)	6,056	Older people living in the community	Falls prediction model including demographic information, self-reported problems with balance and coordination and previous fall history	Falls	AUC 69%
Gadkaree et al. (2015) (3)	6,056	Older people living in the community	Falls prediction model including demographic information, self-reported problems with balance and coordination and previous fall history	Recurrent falls	AUC 70%
Harper et al. (2018) (4)	201	Older people attending the emergency department	Falls Risk for Older Persons-Community Setting Screening Tool	Falls	AUC 57% Sensitivity 39% Specificity 70%
Harper et al. (2018) (4)	201	Older people attending the emergency department	Falls Risk for Older Persons-Community Setting Screening Tool	Falls	AUC 54% Sensitivity 48% Specificity 57%
Hofheinz and Mibs (2016) (5)	120	Older people attending outpatient physiotherapy	Timed up and go	Falls	AUC 58%
Hofheinz and Mibs (2016)(5)	120	Older people attending outpatient physiotherapy	Timed up and go plus manual dual task	Falls	AUC 57%
Hofheinz and Mibs (2016) (5)	120	Older people attending outpatient physiotherapy	Timed up and go plus cognitive dual task	Falls	AUC 65%
Kimura et al. (2018) (6)	360	Older people with cervical myelopathy	Geriatric Locomotive Function Scale	Recurrent falls	AUC 67%
Kimura et al. (2018) (6)	360	Older people with cervical myelopathy	Japanese Orthopaedic Score (lower extremity motor function scale)	Recurrent falls	AUC 61%
Melillo et al. (2017) (7)	141	Older people	Tree-based algorithm (AdaBoost)	Falls in the next year	Sensitivity 69% Specificity 77%
Palumbo et al. (2016) (8)	-	Older people living in the community	Fall Risk Assessment Tool (FRAT-up)	Falls	AUC 65%
Palumbo et al. (2018) (8)	438	Older people living in the community	American Geriatrics Society and British Geriatrics Society Risk Algorithm	Falls	Sensitivity 36% Specificity 84%
Patterson et al. (2018) (9)	4,366	Older people attending the emergency department	Hendrich II fall risk assessment tool	Falls resulting in emergency department admission	AUC 64%
Qiu et al. (2018) (10)	196	Older women living in the community	Wearable sensors	Falls	Sensitivity 93% Specificity 85%

Rodriguez-Molinero et al. (2017) (11)	772	Older people living at home	2-question risk assessment tool	Recurrent falls	Sensitivity 70% Specificity 72% AUC 74%
Sharifi et al. (2015) (12)	194	Older people living in residential care	The European Assessment System Care Standard Falls Risk Assessment	Falls	Sensitivity 86% Specificity 65%
Van Schooten et al. (2016) (13)	319	Older people	Trunk accelerometer	Time to first fall	AUC 66–72%
Van Schooten et al. (2016) (13)	319	Older people	Trunk accelerometer	Time to second fall	AUC 69–76%
Walsh et al. (2017) (14)	128	Older people with history of stroke	Risk assessment model including in hospital falls history and balance	Recurrent falls	Sensitivity 19% Specificity 94% AUC 56%
Walsh et al. (2017) (14)	128	Older people with history of stroke	Risk assessment model including in hospital falls history and upper limb function	Recurrent falls	Sensitivity 52% Specificity 59% AUC 55%
n = number of participants. AUC=area under the curve.					

Multifactorial interventions

1.1.3.1 All older people with recurrent falls or assessed as being at increased risk of falling should be considered for an individualised [multifactorial intervention](#). [2004]

In successful multifactorial intervention programmes the following specific components are common (against a background of the general diagnosis and management of causes and recognised risk factors):

- strength and balance training
- home hazard assessment and intervention
- vision assessment and referral
- medication review with modification/withdrawal. [2004]

1.1.3.2 Following treatment for an injurious fall, older people should be offered a multidisciplinary assessment to identify and address future risk and individualised intervention aimed at promoting independence and improving physical and psychological function. [2004]

Surveillance proposal

This section of the guideline should be updated.

Multifactorial and multiple component interventions

2016 surveillance summary

Five studies of multifactorial falls prevention interventions showed inconsistent results, with 3 studies (15–17) finding a significant reduction in falls after a year, but no effect in the other 2 studies. (18,19)

2019 surveillance summary

We identified 9 studies with 22 analyses of multifactorial and multicomponent interventions (see Table 2 below). Overall, multifactorial interventions did not improve falls outcomes in 13 of 18 analyses (72%). The control groups were mainly usual care or a control that was not specified in the abstract.

A Cochrane review defined multifactorial interventions as having individual components adapted according to risk, and multiple component interventions as using the same interventions on all people irrespective of risk. This review found that across 3 analyses, multiple component interventions reduced falls and rate of falls, but did not affect recurrent falls. Additionally, multiple component interventions did not improve the rate of falls compared with exercise in 1 analysis. In this study, multifactorial interventions did not affect falling. However, the quality of evidence was rated by the authors as low or very low across analyses. Multifactorial and multiple component interventions included interventions from more than one category of intervention

including: exercise, medicine use or review, surgery (such as cataract removal), incontinence management, fluid or nutrition therapy, psychological intervention, environmental adaptation and assistive technology, social environment and services, and knowledge or education interventions. The Cochrane review did not measure the relative effectiveness of the different categories of interventions.

Intelligence gathering

Topic experts noted that the Cochrane reviews of multifactorial and multiple component interventions suggested a need to update the guideline.

Impact statement

The guideline recommends multifactorial interventions, defined as ‘An intervention with multiple components that aims to address the risk factors for falling that are identified in a person’s multifactorial assessment.’

Evidence on multifactorial interventions is inconsistent but showed no effect on falls more often than it showed a reduction in falls. When interventions were classified as multifactorial or multiple component, multiple component interventions (offered to everyone) appear to be effective whereas multifactorial interventions (adapting interventions to the person’s risk) do not appear to be effective.

An update of the guideline is therefore necessary to determine whether people should be offered all intervention components irrespective of their risk. The

update should also identify what intervention components should be offered.

Evidence was identified for people living in residential care and people living in the community. The update should consider what differences in multiple component

interventions may be appropriate for people living in these settings.

New evidence identified that may change current recommendations.

Table 2 Multifactorial or multiple component interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Hopewell et al. (2018) (20)	SR-C	-; 5 studies	Older people living in the community	Multiple component interventions	Exercise	Rate of falls	No effect of intervention
Hopewell et al. (2018) (20)	SR-C	1,085; 6 studies	Older people living in the community	Multiple component interventions	Unspecified control	Rate of falls	Improved with intervention
Hopewell et al. (2018) (20)	SR-C	1,980; 11 studies	Older people living in the community	Multiple component interventions	Unspecified control	Falls	Improved with intervention
Hopewell et al. (2018) (20)	SR-C	3,368; 12 studies	Older people living in the community	Multifactorial interventions	Unspecified control	Recurrent falls	No effect of intervention
Hopewell et al. (2018) (20)	SR-C	5,852; 19 studies	Older people living in the community	Multifactorial interventions	Unspecified control	Rate of falls	Improved with intervention
Hopewell et al. (2018) (20)	SR-C	662; 4 studies	Older people living in the community	Multiple component interventions	Unspecified control	Recurrent falls	No effect of intervention
Hopewell et al. (2018) (20)	SR-C	9,637; 29 studies	Older people living in the community	Multifactorial interventions	Unspecified control	Falls	No effect of intervention
Cameron et al. (2018) (21)	SR-C	3,153, 9 studies	Older people in residential care	Multifactorial interventions	Unspecified control	Risk of falling	No effect of intervention
Cameron et al. (2018) (21)	SR-C	3,439, 13 studies	Older people in residential care	Multifactorial interventions	Unspecified control	Rate of falls	No effect of intervention
Francis-Coad et al. (2018) (22)	SR	-; 12 studies	Older people in residential care	Multifactorial interventions	Unspecified control	Fall rate	No effect of intervention
Francis-Coad et al. (2018) (22)	SR	-; 12 studies	Older people in residential care	Multifactorial interventions	Unspecified control	Number of people falling	No effect of intervention
Guirguis-Blake et al. (2018) (23)	SR	15,506; 26 studies	Older people living in the community	Multifactorial interventions	Unspecified control	Falls	Improved with intervention

Wylie et al. (2019) (24)	SR	6,502; 9 studies	Older people	Multifactorial interventions including podiatry	Usual care	Rate of falls	Improved with intervention
Matchar et al. (2017) (25)	RCT	354	Older people living in the community who recently attended the emergency department	Multifactorial intervention (exercise focused on balance, strength and gait; detection and follow-up for vision impairment, polypharmacy and environmental hazards)	Usual care	Falls	No effect of intervention
Matchar et al. (2017) (25)	RCT	354	Older people living in the community who recently attended the emergency department	Multifactorial intervention (exercise focused on balance, strength and gait; detection and follow-up for vision impairment, polypharmacy and environmental hazards)	Usual care	Falls resulting in injury	Improved with intervention
Matchar et al. (2017) (25)	RCT	354	Older people living in the community who recently attended the emergency department	Multifactorial intervention (exercise focused on balance, strength and gait; detection and follow-up for vision impairment, polypharmacy and environmental hazards)	Usual care	Falls (after adjustment for 2 or more major comorbidities)	Improved with intervention
Mikolaizak et al. (2017) (26)	RCT	221	Older people having a fall attended by a paramedic but not admitted to hospital	Multifactorial intervention (physiotherapy, occupational therapy, geriatric assessment, optometry and medicines management)	Tailored written falls prevention advice	Rate of falls	No effect of intervention
Mikolaizak et al. (2017) (26)	RCT	221	Older people having a fall attended by a paramedic but not admitted to hospital	Multifactorial intervention (physiotherapy, occupational therapy, geriatric assessment, optometry and medicines management)	Tailored written falls prevention advice	Rate of falls (in people who adhered to the intervention)	Improved with intervention

Tan et al. (2018) (27)	RCT	268	Older people with a history of falls	Multifactorial intervention	Usual care	Recurrent falls	No effect of intervention
Tan et al. (2018) (27)	RCT	268	Older people with a history of falls	Multifactorial intervention	Usual care	Rate of falls	No effect of intervention
Tan et al. (2018) (27)	RCT	268	Older people with a history of falls	Multifactorial intervention	Usual care	Time to first fall	No effect of intervention

n = number of participants. SR-C = Cochrane review. SR = systematic review. RCT = randomised controlled trial.

Strength and balance training

1.1.4.1 Strength and balance training is recommended. Those most likely to benefit are [older people living in the community](#) with a history of recurrent falls and/or balance and gait deficit. A muscle-strengthening and balance programme should be offered. This should be individually prescribed and monitored by an appropriately trained professional. [2004]

Exercise in extended care settings

1.1.5.1 [Multifactorial interventions](#) with an exercise component are recommended for older people in [extended care](#) settings who are at risk of falling. [2004]

Surveillance proposal

This section of the guideline should be updated.

Exercise interventions

2016 surveillance summary

In previous surveillance, 12 studies assessing a variety of exercise interventions were identified. Overall, there were inconsistent effects on falls (4 studies (28–31) did not show any effects on falls, 5 studies (32–36) showed a reduction in falls and 1 study showed increased time to falling (37). One study suggested that a group-based exercise programme may not be cost effective. (38)

One home-based exercise programme (39) increased the risk of falls.

2019 surveillance summary

We identified 20 studies containing 52 comparisons of exercise interventions (see Table 3 below). Overall, exercise interventions improved falls outcomes in 38 of 52 analyses (73%), including reductions in rate of falls, number of people falling and number of falls resulting in injury, needing medical attention or admission to hospital. Several types of exercise were effective, including those focusing on balance and strength, function

and Tai chi. However, training in the Alexander technique did not reduce falls or falls resulting in injury. Controls were mainly compared with usual care, a control that was not specified in the abstract, or other types of exercise.

The identified studies mainly included people living in the community, but some studies included people living in residential care. However, reductions in falling were seen inconsistently across the studies.

Intelligence gathering

Topic experts indicated that a Cochrane review(40) of exercise in people living in the community indicated a need to update the guideline. This review suggested that several types of exercise may reduce falling.

Topic experts also highlighted that exercise programmes may be less accessible for some people, such as those living in remote areas. Additionally, the need for maintaining physical activity outside of prescribed exercise was thought to be important.

A [rapid review for the update of guidance on physical activity from the Chief Medical Officer](#) found that evidence supports

strength and balance training for people at risk of falls.

Impact statement

The evidence for the effect of exercise on falling generally supports a range of types of exercise. However, the guideline only recommends strength and balance training. Therefore, an update is needed to consider whether other types of exercise should be recommended.

There is increasing recognition of the importance of physical activity at all ages. Updated guidance on physical activity from the Chief Medical Officer is expected in 2019. The update should consider how to encourage people at risk of falls to undertake the recommended levels of physical activity safely, and how to maintain benefits after prescribed exercise programmes end.

Identified evidence addressed people living in the community and people living in residential care. The update should also consider practical ways to include people in extended care settings in exercise programmes.

New evidence identified that may change current recommendations.

Table 3 Exercise interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Tricco et al. (2017) (41)	SR-NMA	41,596; 54 studies	Older people	Exercise	Usual care	Falls resulting in injury	Improved with intervention
Tricco et al. (2017) (41)	SR-NMA	41,596; 54 studies	Older people	Exercise plus vision assessment and treatment	Usual care	Falls resulting in injury	Improved with intervention

Tricco et al. (2017) (41)	SR-NMA	41,596; 54 studies	Older people	Exercise plus vision assessment and treatment plus environmental assessment and modification	Usual care	Falls resulting in injury	Improved with intervention
Cameron et al. (2018) (21)	SR-C	2,002, 10 studies	Older people in residential care	Exercise programmes	Unspecified control	Rate of falls	No effect of intervention
Cameron et al. (2018) (21)	SR-C	2,090, 10 studies	Older people in residential care	Exercise programmes	Unspecified control	Risk of falling	No effect of intervention
Sherrington et al. (2019) (40)	SR-C	12,981; 59 studies	Older people living in the community	Exercise	Unspecified control	Rate of falls	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	13,518; 63 studies	Older people living in the community	Exercise	Unspecified control	Number of people falling	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	4,047; 10 studies	Older people living in the community	Exercise	Unspecified control	Falls resulting in fracture	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	1,019; 5 studies	Older people living in the community	Exercise	Unspecified control	Falls needing medical attention	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	1,705; 2 studies	Older people living in the community	Exercise	Unspecified control	Falls resulting in admission to hospital	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	7,920; 39 studies	Older people living in the community	Balance and functional exercise	Unspecified control	Rate of falls	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	1,374; 11 studies	Older people living in the community	Multiple types of exercise (mostly balance and functional plus resistance exercise)	Unspecified control	Rate of falls	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	1,623; 17 studies	Older people living in the community	Multiple types of exercise (mostly balance and functional plus resistance exercise)	Unspecified control	Number of people falling	Improved with intervention
Sherrington et al. (2019) (40)	SR-C	2,655; 7 studies	Older people living in the community	Tai chi	Unspecified control	Rate of falls	Improved with intervention
Burton et al. (2015) (42)	SR	-; 4 studies	People with dementia	Exercise programmes	Unspecified control	Number of falls	Improved with intervention
Burton et al. (2015) (42)	SR	-; 4 studies	People with dementia	Exercise programmes	Unspecified control	Risk of falling	Improved with intervention
Dillon et al. (2018) (43)	SR	539	Older people with vision impairment	Falls prevention exercise programme	Unspecified control	Falls	No effect of intervention

Guirguis-Blake et al. (2018) (23)	SR	7,297; 21 studies	Older people living in the community	Exercise interventions	Unspecified control	Number of people falling	Improved with intervention
Guirguis-Blake et al. (2018) (23)	SR	7,297; 21 studies	Older people living in the community	Exercise interventions	Unspecified control	Falls	No effect of intervention
Guirguis-Blake et al. (2018) (23)	SR	7,297; 21 studies	Older people living in the community	Exercise interventions	Unspecified control	Falls resulting in injury	No effect of intervention
Jepsen et al. (2017) (44)	SR	746; 4 studies	Older people	Whole-body vibration exercise	Unspecified control	Rate of falls	Improved with intervention
Jepsen et al. (2018) (44)	SR	805; 3 studies	Older people	Whole-body vibration exercise	Unspecified control	Falls	No effect of intervention
Lee and Kim (2017) (45)	SR	5,540; 12 studies	Older people living in residential care	Exercise	Unspecified control	Rate of falls	Improved with intervention
Lee and Kim (2017) (45)	SR	5,540; 12 studies	Older people living in residential care	Exercise	Unspecified control	Recurrent falls	Improved with intervention
Lee and Kim (2017) (45)	SR	5,540; 12 studies	Older people living in residential care	Exercise plus other falls interventions	Unspecified control	Rate of falls	Improved with intervention
Lee and Kim (2017) (45)	SR	5,540; 12 studies	Older people living in residential care	Exercise plus other falls interventions	Unspecified control	Number of people falling	Improved with intervention
Lomas-Vega et al. (2017) (46)	SR	10 studies	Older people	Tai chi	Unspecified control	Falls	Improved with intervention
Lomas-Vega et al. (2017) (46)	SR	10 studies	Older people	Tai chi	Unspecified control	Falls resulting in injury	Improved with intervention
Lomas-Vega et al. (2017) (46)	SR	10 studies	Older people	Tai chi	Unspecified control	Time to first fall	No effect of intervention
Naseri et al. (2018) (47)	SR	3,290; 16 studies	Older people living in the community recently discharged from hospital	Home exercise	Unspecified control	Number of people falling	Worse with intervention
Naseri et al. (2018) (47)	SR	3,290; 16 studies	Older people living in the community recently discharged from hospital	Home exercise	Unspecified control	Falls rate	No effect of intervention
Okubo et al. (2017) (48)	SR	660; 7 studies	Older people	Stepping intervention	Unspecified control	Rate of falls	Improved with intervention
Okubo et al. (2017) (48)	SR	660; 7 studies	Older people	Stepping intervention	Unspecified control	Number of people falling	Improved with intervention
Gawler et al. (2016) (49)	RCT-C	1,256	Older people living in the community	Home exercise	Usual care	Falls resulting in injury	Improved with intervention
Gawler et al. (2016) (49)	RCT-C	1,256	Older people living in the community	Home exercise	Usual care	Falls resulting in injury (12 month follow-up)	Improved with intervention

Gawler et al. (2016) (49)	RCT-C	1,256	Older people living in the community	Home exercise	Usual care	Falls	Improved with intervention
Gawler et al. (2016) (49)	RCT-C	1,256	Older people living in the community	Home exercise (participants maintaining 150 minutes of activity per week)	Home exercise (participants not maintaining 150 minutes of activity per week)	Falls (2 years after intervention)	Improved with intervention
Gawler et al. (2016) (49)	RCT-C	1,256	Older people living in the community	Group exercise	Usual care	Falls	No effect of intervention
Hewitt et al. (2018) (50)	RCT-C	221	Older people living in residential care	Progressive resistance and balance training	Usual care	Falls	Improved with intervention
Gleeson et al. (2015) (51)	RCT	120	Older people living in the community with visual impairment	Alexander technique training	Usual care	Falls	No effect of intervention
Gleeson et al. (2015) (51)	RCT	120	Older people living in the community with visual impairment	Alexander technique training	Usual care	Falls resulting in injury	No effect of intervention
Li et al. (2018a) (52)	RCT	670	Older people with falls history or impaired mobility	Tai chi	Exercise (stretching)	Rate of falls	Improved with intervention
Li et al. (2018a) (52)	RCT	670	Older people with falls history or impaired mobility	Tai chi	Exercise (balance, aerobics, strength)	Rate of falls	Improved with intervention
Li et al. (2018b) (52)	RCT	120	Older people	Exercise (platform training with functional electric stimulation)	Exercise (balance)	Rate of falls	Improved with intervention
Li et al. (2018b) (52)	RCT	120	Older people	Exercise (platform training with functional electric stimulation)	Exercise (balance)	Number of people falling	Improved with intervention
Pang et al. (2018) (53)	RCT	84	Older people with history of stroke	Exercise (dual task balance and mobility intervention)	Unspecified control	Falls	Improved with intervention
Pang et al. (2018) (53)	RCT	84	Older people with history of stroke	Exercise (dual task balance and mobility intervention)	Unspecified control	Falls resulting in injury	Improved with intervention
Patil et al. (2015) (54)	RCT	409	Women with history of falling	Exercise (group classes plus home exercise)	Usual care	Falls	No effect of intervention

Patil et al. (2015) (54)	RCT	409	Women with history of falling	Exercise (group classes plus home exercise)	Usual care	Falls resulting in injury needing medical attention	Improved with intervention
Toots et al. (2018) (55)	RCT	186	Older people with dementia living in residential care	Exercise (high intensity functional programme)	Seated attention control activity	Rate of falls	No effect of intervention
Toots et al. (2018) (55)	RCT	186	Older people with dementia living in residential care	Exercise (high intensity functional programme)	Seated attention control activity	Falls resulting in injury	Improved with intervention
Li et al. (2018a) (52)	RCT	670	Older people with falls history or impaired mobility	Exercise (balance, aerobics, strength)	Exercise (stretching)	Rate of falls	Improved with intervention

n = number of participants. SR-NMA = systematic review with network meta-analysis. SR-C = Cochrane review. SR = systematic review. RCT-C = cluster randomised controlled trial. RCT = randomised controlled trial.

Home hazard and safety intervention

- 1.1.6.1 Older people who have received treatment in hospital following a fall should be offered a home hazard assessment and safety intervention/modifications by a suitably trained healthcare professional. Normally this should be part of discharge planning and be carried out within a timescale agreed by the patient or carer, and appropriate members of the health care team. [2004]
- 1.1.6.2 Home hazard assessment is shown to be effective only in conjunction with follow-up and intervention, not in isolation. [2004]

Surveillance proposal

Although the new evidence indicates no need to update these recommendations, the proposed update to the section on multifactorial interventions means this section should be considered in the update.

Home hazard modification and occupational health assessments

2016 surveillance summary

In previous surveillance of this guideline, no studies relevant to this section of the guideline were identified.

2019 surveillance summary

We identified 2 studies (1 systematic review and 1 randomised controlled trial [RCT]) of home hazard or occupational health interventions (see Table 4 below).

The systematic review suggested that home hazard modification reduces the number of falls.

The RCT suggested that an occupational therapy home visit reduced the number of people falling, number of falls, and first falls within 6 months but did not affect first falls within 9 or 12 months.

Intelligence gathering

No relevant information was identified.

Impact statement

The findings that home hazard modification or occupational health assessments reduce falls are consistent

with the current recommendation to offer assessment and interventions to improve home safety. An update has been recommended for the section on multifactorial interventions and home hazard assessment and modification is a component of multifactorial intervention, this section should be considered in the update.

New evidence identified that may change current recommendations.

Table 4 Home hazard and occupational health interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Naseri et al. (2018) (47)	SR	3,290; 16 studies	Older people living in the community recently discharged from hospital	Home hazard modification	Unspecified control	Number of falls	Improved with intervention
Chu et al. (2017) (56)	RCT	311	Older people with falls history	Occupational therapy home visit	Research assistant 'well-wishing' visit	Number of people falling	Improved with intervention
Chu et al. (2017) (56)	RCT	311	Older people with falls history	Occupational therapy home visit	Research assistant 'well-wishing' visit	Number of falls	Improved with intervention
Chu et al. (2017) (56)	RCT	311	Older people with falls history	Occupational therapy home visit	Research assistant 'well-wishing' visit	First fall within 6 months	Improved with intervention
Chu et al. (2017) (56)	RCT	311	Older people with falls history	Occupational therapy home visit	Research assistant 'well-wishing' visit	First fall within 9 or 12 months	No effect of intervention

n = number of participants. SR = systematic review. RCT = randomised controlled trial.

Psychotropic medications

1.1.7.1 Older people on psychotropic medications should have their medication reviewed, with specialist input if appropriate, and discontinued if possible to reduce their risk of falling. [2004]

Surveillance proposal

This recommendation should be updated.

Medicines interventions

2016 surveillance summary

In previous surveillance of this guideline, no studies relevant to this section of the guideline were identified.

2019 surveillance summary

Interventions to review medicines or reduce medicines known to be associated with falls did not reduce falling in 2 studies (one Cochrane review and one RCT that aimed to stop drugs known to increase risk of falls including psychotropic and cardiovascular drugs) with 5 analyses. This included no effect on rate of falls or time to first or second fall or time to first attendance at the emergency department because of a fall.

Intelligence gathering

Topic experts noted that polypharmacy may be associated with increased risk of falls.

Impact statement

The identified evidence that medicines interventions, including reducing psychotropic and cardiovascular medicines did not reduce falls appears to contradict the current recommendation to review the use of psychotropic medicines in older people. However, optimising medicine use has wider benefits than simply preventing falls and should continue as an essential component of good prescribing practice.

Additionally, there is a need to understand whether people taking multiple drugs are at higher risk of falling, and whether this is caused by the underlying conditions or by drug treatments or both.

Therefore, the update should consider whether this aspect of the guideline on falls prevention is adequately covered by NICE's guidelines on [multimorbidity](#) and [medicines optimisation](#), which consider wider outcomes, including cross-referring to suitable existing recommendations.

New evidence identified that may change current recommendations.

Table 5 Medicines interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Cameron et al. (2018) (21)	SR-C	2,409, 6 studies	Older people in residential care	Medicines review	Unspecified control	Rate of falls	No effect of intervention

Cameron et al. (2018) (21)	SR-C	5,139, 6 studies	Older people in residential care	Medicines review	Unspecified control	Risk of falling	No effect of intervention
Boye et al. (2017) (57)	RCT	612	Presented to emergency department with fall	Stopping drugs known to increase risk of falls (including psychotropic and cardiovascular drugs)	Usual care	Time to first fall	No effect of intervention
Boye et al. (2017) (57)	RCT	612	Presented to emergency department with fall	Stopping drugs known to increase risk of falls (including psychotropic and cardiovascular drugs)	Usual care	Time to second fall	No effect of intervention
Boye et al. (2017) (57)	RCT	612	Presented to emergency department with fall	Stopping drugs known to increase risk of falls (including psychotropic and cardiovascular drugs)	Usual care	Time to first emergency department visit with fall	No effect of intervention

n = number of participants. SR-C = Cochrane review. RCT = randomised controlled trial.

Cardiac pacing

1.1.8.1 Cardiac pacing should be considered for older people with cardioinhibitory carotid sinus hypersensitivity who have experienced unexplained falls. [2004]

Surveillance proposal

Although no new evidence impacting on these recommendations was identified, the update should cover this section of the guideline so that recommendations reflect any changes in services since the original guideline was published.

Encouraging the participation of older people in falls prevention programmes

- 1.1.9.1 To promote the participation of older people in falls prevention programmes the following should be considered.
- Healthcare professionals involved in the assessment and prevention of falls should discuss what changes a person is willing to make to prevent falls.
 - Information should be relevant and available in languages other than English.

- Falls prevention programmes should also address potential barriers such as low self-efficacy and fear of falling, and encourage activity change as negotiated with the participant. [2004]

1.1.9.2 Practitioners who are involved in developing falls prevention programmes should ensure that such programmes are flexible enough to accommodate participants' different needs and preferences and should promote the social value of such programmes. [2004]

Education and information giving

1.1.10.1 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. [2004]

1.1.10.2 Individuals at risk of falling, and their carers, should be offered information orally and in writing about:

- what measures they can take to prevent further falls
- how to stay motivated if referred for falls prevention strategies that include exercise or strength and balancing components
- the preventable nature of some falls
- the physical and psychological benefits of modifying falls risk
- where they can seek further advice and assistance
- how to cope if they have a fall, including how to summon help and how to avoid a long lie. [2004]

Surveillance proposal

Although no new evidence impacting on these recommendations was identified, the update should cover this section of the guideline so that recommendations reflect any changes in services since the original guideline was published.

Interventions that cannot be recommended

1.1.11.1 **Brisk walking.** There is no evidence* that brisk walking reduces the risk of falling. One trial showed that an unsupervised brisk walking programme increased the risk of falling in postmenopausal women with an upper limb fracture in the previous year. However, there may be other health benefits of brisk walking by older people. [2004]

*This refers to evidence reviewed in 2004.

Surveillance proposal

This section of the guideline should be updated.

2016 surveillance summary

In previous surveillance of this guideline, no studies relevant to this section of the guideline were identified.

2019 surveillance summary

No relevant evidence was identified. However, a substantial body of evidence was identified for other types of exercise (see Table 3 above).

Intelligence gathering

No information relevant to this section was identified.

Impact statement

Although this guideline recommends against unsupervised brisk walking, NICE's

guideline on [mental wellbeing in over 65s: occupational therapy and physical activity interventions](#) recommends supervised walking schemes. Because exercise in general offers benefits for people at risk of falls (see [exercise interventions](#) above), the current recommendation on brisk walking in the falls guideline could lead to lower rates of walking as a method of physical activity in people at risk of falls.

Because we plan to update the section on exercise, this recommendation should also be updated. The update should consider how people at risk of falls can achieve and maintain recommended levels of physical activity, including walking.

New evidence identified that may change current recommendations.

Interventions that cannot be recommended because of insufficient evidence

We do not recommend implementation of the following interventions at present. This is not because there is strong evidence against them, but because there is insufficient or conflicting evidence supporting them*. [2004]

*This refers to evidence reviewed in 2004.

1.1.12.1 Low intensity exercise combined with incontinence programmes. There is no evidence* that low intensity exercise interventions combined with continence promotion programmes reduce the incidence of falls in older people in [extended care](#) settings. [2004]

*This refers to evidence reviewed in 2004.

1.1.12.2 **Group exercise (untargeted).** Exercise in groups should not be discouraged as a means of health promotion, but there is little evidence* that exercise interventions that were not individually prescribed for [older people living in the community](#) are effective in falls prevention. [2004]

*This refers to evidence reviewed in 2004.

1.1.12.3 **Cognitive/behavioural interventions.** There is no evidence* that cognitive/behavioural interventions alone reduce the incidence of falls in [older people living in the community](#) who are of unknown risk status. Such interventions included risk assessment with feedback and counselling and individual education discussions. There is no evidence* that complex interventions in which group activities included education, a behaviour modification programme aimed at moderating risk, advice and exercise interventions are effective in falls prevention with older people living in the community. [2004]

*This refers to evidence reviewed in 2004.

1.1.12.4 **Referral for correction of visual impairment.** There is no evidence* that referral for correction of vision as a single intervention for [older people living in the community](#) is effective in reducing the number of people falling. However, vision assessment and referral has been a component of successful multifactorial falls prevention programmes. [2004]

*This refers to evidence reviewed in 2004.

1.1.12.5 **Vitamin D.** There is evidence* that vitamin D deficiency and insufficiency are common among older people and that, when present, they impair muscle strength and possibly neuromuscular function, via CNS-mediated pathways. In addition, the use of combined calcium and vitamin D3 supplementation has been found to reduce fracture rates in older people in residential/nursing homes and sheltered accommodation. Although there is emerging evidence* that correction of vitamin D deficiency or insufficiency may reduce the propensity for falling, there is uncertainty about the relative contribution to fracture reduction via this mechanism (as opposed to bone mass) and about the dose and route of administration required. No firm recommendation can therefore currently be made on its use for this indication.† [2004, amended 2013]

*This refers to evidence reviewed in 2004.

†The following text has been deleted from the 2004 recommendation: 'Guidance on the use of vitamin D for fracture prevention will be contained in the forthcoming NICE clinical practice guideline on osteoporosis, which is currently under development.' As yet there is no NICE guidance on the use of vitamin D for fracture prevention.

1.1.12.6 **Hip protectors.** Reported trials that have used individual patient randomisation have provided no evidence* for the effectiveness of hip protectors to prevent fractures when offered to older people living in extended care settings or in their own homes. Data from cluster randomised trials provide some evidence* that hip

protectors are effective in the prevention of hip fractures in older people living in [extended care](#) settings who are considered at high risk. [2004]

*This refers to evidence reviewed in 2004.

Surveillance proposal

This section of the guideline should be updated.

2016 surveillance summary

In previous surveillance of this guideline, no studies relevant to this section of the guideline were identified.

2019 surveillance summary

Nutritional support

Nutritional interventions, including vitamin supplementation, were assessed in 9 studies with 13 analyses and were mainly compared with placebo, another dosage of the intervention or a control that was not specified in the abstract. The most commonly studied nutritional intervention was vitamin D supplementation (11 analyses from 7 studies). Vitamin D supplementation reduced falls and recurrent falls in 4 analyses, showed no effect on falls or time to first fall in 6 analyses. In 2 analyses, high-dose vitamin D or vitamin D with calcifediol increased falling.

In one randomised controlled trial, tailored nutritional advice reduced falls in people with Alzheimer's who live at home with a spouse. Nutritional supplementation also reduced falls in people who were malnourished and had recently been discharged from hospital in one study.

Cognitive and behavioural interventions

Two RCTs suggested that a brief educational intervention or cognitive behavioural therapy had no effect on falls (see Table 7 below).

Intelligence gathering

Topic experts indicated that new evidence on vitamin D supplementation should be assessed.

Impact statement

Nutritional support

NICE has published guidance on [vitamin D supplement use in specific population groups](#). People aged 65 and older are one of the populations covered by this guideline. It recommends that a fall is a clinical reason to test for vitamin D deficiency and that falls appointments and check-ups are an opportunity to recommend and record use of vitamin D supplements. However, these recommendations may appear to be contradictory to the recommendation in the falls prevention guideline that notes a lack of evidence for this intervention. The population in the vitamin D supplement use guideline should have known vitamin D deficiency because it recommends testing, whereas the recommendation in the falls prevention guidelines may refer to

vitamin D supplementation without knowing whether the person has a deficiency. The update should consider the role of vitamin D in falls prevention.

Cognitive and behavioural interventions

Evidence identified in surveillance supports the current recommendation noting a lack of evidence for such interventions. However, the update of the whole guideline is an opportunity to re-consider this recommendation.

Low intensity exercise combined with incontinence programmes and untargeted group exercise

Although no relevant evidence was identified for low intensity exercise combined with incontinence programmes and untargeted group exercise, a substantial body of evidence was identified for other types of exercise. Therefore, the update should consider all recommendations involving exercise.

Referral for correction of visual impairment

Although no studies of referral for correction of visual impairment were identified, it was a component in some studies of multifactorial interventions. The finding that multifactorial interventions may not reduce falls (see [multifactorial interventions](#) above) therefore, appears to contradict the recommendation that referral for correction of visual impairment may not be effective as a single intervention but may be a component of a multifactorial intervention. The update should consider the role of correcting visual impairment in falls prevention.

Hip protectors

No new evidence or other information on hip protectors was identified. The update should consider whether this intervention remains relevant to clinical practice in the UK.

New evidence identified that may change current recommendations.

Table 6 Nutritional interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Cameron et al. (2018) (21)	SR-C	4,512; 4 studies	Older people in residential care	Vitamin D supplementation	Unspecified control	Risk of falling	No effect of intervention
Cameron et al. (2018) (21)	SR-C	4,512; 4 studies	Older people in residential care	Vitamin D supplementation	Unspecified control	Rate of falls	Improved with intervention
Guirguis-Blake et al. (2018) (23)	SR	7,531; 7 studies	Older people living in the community	Vitamin D supplementation	Unspecified control	Falls	No effect of intervention
Naseri et al. (2018) (47)	SR	3,290; 16 studies	Older people living in the community recently discharged from hospital	Nutritional supplementation	Unspecified control	Number of people falling	Improved with intervention

Wu and Pang (2017) (58)	SR	32,686; 26 studies	Older people	Vitamin D plus calcium supplementation	Unspecified control	Falls	Improved with intervention
Wu and Pang (2017) (58)	SR	32,686; 26 studies	Older people	Vitamin D3	Unspecified control	Falls	No effect of intervention
Wu and Pang (2017) (58)	SR	32,686; 26 studies	Older people	Vitamin D2	Unspecified control	Falls	No effect of intervention
Bischoff-Ferrari et al. (2016) (59)	RCT	200	Living at home with falls history	Vitamin D supplementation (vitamin D3 24,000 IU daily + calcifediol)	Vitamin D supplementation (vitamin D3 24,000 IU daily)	Falls	Worse with intervention
Bischoff-Ferrari et al. (2016) (59)	RCT	200	Living at home with falls history	Vitamin D supplementation (vitamin D3 60,000 IU daily)	Vitamin D supplementation (vitamin D3 24,000 IU)	Falls	Worse with intervention
Cangussu et al. (2016) (60)	RCT	160	Older women with falls history	Vitamin D supplementation (vitamin D3, 1,000 IU daily)	Placebo	Recurrent falls	Improved with intervention
Khaw et al. (2017) (61)	RCT	5,110	Older people	Vitamin D supplementation (colecalfiferol)	Placebo	Falls	No effect of intervention
Suominen et al. (2015) (62)	RCT	78	Older people with Alzheimer's disease living with a spouse	Tailored nutritional guidance	Usual care plus written information about nutrition in older adults	Falls	Improved with intervention
Swart et al. (2016) (63)	RCT	2,919	Older people with raised homocysteine concentrations	Vitamin B12 and folic acid supplementation	Placebo	Time to first fall	No effect of intervention

n = number of participants. SR-C = Cochrane review. SR = systematic review. RCT = randomised controlled trial.

Table 7 Cognitive and behavioural interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Harper et al. (2017) (64)	RCT	412	Older people attending the emergency department	Brief educational intervention	Unspecified control	Falls	No effect of intervention
Parry et al. (2016) (65)	RCT	415	Older people with excessive or undue fear of falling	Cognitive behavioural therapy	Usual care	Falls	No effect of intervention

n = number of participants. RCT = randomised controlled trial.

Interventions not currently covered in the guideline

In surveillance, evidence was identified for areas not covered by the guideline. This new evidence has been considered for possible addition as a new section of the guideline.

Surveillance proposal

The update to the guideline should consider the role of interventions that were not included in the recommendations in the current guideline.

2016 surveillance summary

In 2016 surveillance 1 study (66) suggested no effect of case management on falls compared with control.

2019 surveillance summary

Podiatry interventions

Podiatry interventions were assessed in one systematic review and one RCT with 7 analyses conducted (see Table 8). Podiatry interventions showed inconsistent results, with a podiatry intervention reducing the number of people falling and falling repeatedly, but not reducing the incidence of falls. The podiatry intervention increased foot pain but had 65% probability of being cost-effective at a threshold of £30,000 per quality-adjusted life year. Evidence indicated that multicomponent podiatry interventions may reduce the rate of falls whereas single-component interventions may not affect falling.

Other interventions

Other interventions (see Table 9 below) were assessed in 10 studies (2 systematic reviews and 3 RCTs) and were effective in 8 of 10 analyses (80%). Control groups

were generally usual care or an attention control. Interventions that were associated with reduced falls included:

- case management plus patient reminders (with or without staff education)
- self-care interventions
- telehealth rehabilitation

Evidence indicated a falls prevention programme plus staff training may not be more effective than the falls prevention programme alone.

Referral to community falls service reduced falls in one RCT, but an earlier systematic review suggested that risk screening and referral to falls prevention programmes had no effect on falls.

Intelligence gathering

No topic expert feedback was relevant to this section.

Impact statement

Evidence on podiatry interventions appears to be inconsistent but case management, self-care interventions and telehealth interventions may reduce falls. The update should consider whether

recommendations are needed to address these interventions for falls prevention.

New evidence identified that may impact on the guideline.

Table 8 Podiatry interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Wylie et al. (2019) (24)	SR	6,502; 9 studies	Older people	Multifaceted podiatry intervention	Usual care	Rate of falls	Improved with intervention
Wylie et al. (2019) (24)	SR	6,502; 9 studies	Older people	Single-component podiatry intervention	Usual care	Rate of falls	No effect of intervention
Cockayne et al. (2017) (67)	RCT	1,010	Older people	Podiatry falls reduction intervention	Usual podiatry care plus falls prevention leaflet	Falls incidence	No effect of intervention
Cockayne et al. (2017) (67)	RCT	1,010	Older people	Podiatry falls reduction intervention	Usual podiatry care plus falls prevention leaflet	Number of people falling	Improved with intervention
Cockayne et al. (2017) (67)	RCT	1,010	Older people	Podiatry falls reduction intervention	Usual podiatry care plus falls prevention leaflet	Number of people with 2 or more falls	Improved with intervention
Cockayne et al. (2017) (67)	RCT	1,010	Older people	Podiatry falls reduction intervention	Usual podiatry care plus falls prevention leaflet	Foot pain	Worse with intervention
Cockayne et al. (2017) (67)	RCT	1,010	Older people	Podiatry falls reduction intervention	Usual podiatry care plus falls prevention leaflet	Cost-effectiveness	65% probability of being cost effective at a threshold of £30,000 per QALY gained

n = number of participants. SR = systematic review. RCT = randomised controlled trial.

Table 9 Other interventions

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Tricco et al. (2019) (41)	SR-NMA	26,326; 29 studies	Older people	Case management plus patient reminders	Usual care	Number of people falling	Improved with intervention
Tricco et al. (2019) (41)	SR-NMA	26,326; 29 studies	Older people	Case management plus patient reminders plus staff education	Usual care	Number of people falling	Improved with intervention
Tricco et al. (2019) (41)	SR-NMA	26,326; 29 studies	Older people	Team changes	Usual care	Falls resulting in injury	Improved with intervention
Wong et al. (2018) (68)	SR	14,364; 22 studies	Older people living in the community	Self-care interventions (including two of the following components: individual	Unspecified control	Falls	Improved with intervention

				assessment, care planning or provision of information)			
Zozula et al. (2016) (69)	SR	–; 6 studies	Older people living in the community	Pre-hospital fall risk screening and referral	Unspecified control	Falls	No effect of intervention
Colon-Emeric et al. (2017) (70)	RCT-C	1,794	Older people living in nursing homes	Falls prevention programme plus staff training	Falls prevention programme	Fall rate	No effect of intervention
Snooks et al. (2017) (71)	RCT-C	4,655	Older people having a fall attended by paramedics	Referral to community falls service instead of hospital admission	Usual care	Recurrent falls	Improved with intervention
Bernocchi et al. (2018) (72)	RCT	283	Living at home; at high risk of fall	Telehealth rehabilitation	Usual care	Falls	Improved with intervention
Bernocchi et al. (2018) (72)	RCT	283	Living at home; at high risk of fall	Telehealth rehabilitation	Usual care	Time to first fall	Improved with intervention
Bernocchi et al. (2018) (72)	RCT	283	Living at home; at high risk of fall	Telehealth rehabilitation	Usual care	2 or more falls	Improved with intervention

n = number of participants. SR-NMA = systematic review with network meta-analysis. SR = systematic review. RCT-C = cluster randomised controlled trial. RCT = randomised controlled trial.

Preventing falls in older people during a hospital stay

Predicting patients' risk of falling in hospital

- 1.2.1.1 Do not use fall [risk prediction tools](#) to predict inpatients' risk of falling in hospital. [new 2013]
- 1.2.1.2 Regard the following groups of inpatients as being at risk of falling in hospital and manage their care according to recommendations 1.2.2.1 to 1.2.3.2:
- all patients aged 65 years or older
 - patients aged 50 to 64 years who are judged by a clinician to be at higher risk of falling because of an underlying condition. [new 2013]

Assessment and interventions

- 1.2.2.1 Ensure that aspects of the inpatient environment (including flooring, lighting, furniture and fittings such as hand holds) that could affect patients' risk of falling are systematically identified and addressed. [new 2013]
- 1.2.2.2 For patients at risk of falling in hospital (see recommendation 1.2.1.2), consider a [multifactorial assessment](#) and a [multifactorial intervention](#). [new 2013]

- 1.2.2.3 Ensure that any [multifactorial assessment](#) identifies the patient's individual risk factors for falling in hospital that can be treated, improved or managed during their expected stay. These may include:
- cognitive impairment
 - continence problems
 - falls history, including causes and consequences (such as injury and fear of falling)
 - footwear that is unsuitable or missing
 - health problems that may increase their risk of falling
 - medication
 - postural instability, mobility problems and/or balance problems
 - syncope syndrome
 - visual impairment. **[new 2013]**
- 1.2.2.4 Ensure that any [multifactorial intervention](#):
- promptly addresses the patient's identified individual risk factors for falling in hospital **and**
 - takes into account whether the risk factors can be treated, improved or managed during the patient's expected stay. **[new 2013]**
- 1.2.2.5 Do not offer falls prevention interventions that are not tailored to address the patient's individual risk factors for falling. **[new 2013]**

Information and support

- 1.2.3.1 Provide relevant oral and written information and support for patients, and their family members and carers if the patient agrees. Take into account the patient's ability to understand and retain information. Information should include:
- explaining about the patient's individual risk factors for falling in hospital
 - showing the patient how to use the nurse call system and encouraging them to use it when they need help
 - informing family members and carers about when and how to raise and lower bed rails
 - providing consistent messages about when a patient should ask for help before getting up or moving about
 - helping the patient to engage in any [multifactorial intervention](#) aimed at addressing their individual risk factors. **[new 2013]**

- 1.2.3.2 Ensure that relevant information is shared across services. Apply the principles in [Patient experience in adult NHS services](#) (NICE guideline CG138) in relation to continuity of care. [new 2013]

Surveillance proposal

Although new evidence is consistent with current recommendations, this section of the guideline should be included in the update to ensure that recommendations support continuity of care across settings.

Risk assessment tools

2016 surveillance summary

One study (73) of the Morse Fall Scale found this tool to be insufficient for clinical use.

2019 surveillance summary

We identified 7 studies of tools for predicting risk of falls in older people in hospital. Many tools showed adequate sensitivity or specificity, but few tools had both sufficient sensitivity and specificity. The predictive ability of the Morse Fall Scale showed inconsistent results, although it may be useful when combined with assessing use of medicines associated with falls.

Intelligence gathering

No information relevant to this section was identified.

Impact statement

In developing the guideline, studies of tools to assess risk of falls in hospital were included only if they had sensitivity and specificity of more than 70%. None of the studies identified in surveillance met these

criteria so are insufficient to inform an update to the guideline in this area.

New evidence is unlikely to change guideline recommendations.

In-hospital interventions

2016 surveillance

Overall, 5 studies were identified.

3 studies showed no effect on falls:

- 1 study of bed and bedside chair pressure sensors (74)
- 1 study of an intervention to increase bed alarm use (75)
- 1 study of a multifactorial fall-and-fracture risk-based intervention programme in a geriatric hospital (76)

One study (77) found that shock-absorbing flooring increased the number of falls

One study (78) of individualised falls-prevention education for patients, supported by training and feedback for staff in a rehabilitation ward showed fewer falls and falls causing injury.

2019 surveillance

Interventions to prevent falls in hospital were studied in 3 systematic reviews (see Table 11 below). A systematic review suggested that a delirium-prevention intervention reduced falls and a Cochrane review found that additional physiotherapy reduced the risk of falling but not the rate of falling. This Cochrane review also found that multifactorial interventions or bed and chair sensor alarms had no effect on the risk of falling or the rate of falls in hospital. The control group in these studies was not specified in the abstracts.

A systematic review sought evidence on the effects of bedrails on falls in hospital but found no studies.

Intelligence gathering

No information relevant to this section was identified.

Impact statement

The evidence identified for interventions to prevent falls in hospital suggests that

bed and bedside chair sensors, bed alarms, and multifactorial interventions may not reduce falls.

Physiotherapy showed inconsistent results depending on the measure of falls, and no evidence on bedrails could be found.

Preventing delirium may have a beneficial effect on falls. NICE's guideline on [delirium](#) recommends assessing the risk of delirium in people at risk and interventions to prevent delirium. People at risk of delirium share several characteristics of the population at risk of falls, such as age, presence of cognitive impairment, and hip fracture. The evidence identified in surveillance does not indicate a need to update the guideline on delirium.

Overall, there was no indication of a need to update the guideline in this area.

New evidence is unlikely to change guideline recommendations.

Table 10 Clinical prediction tools for falls risk in people in hospital

Authors (Year)	n	Population	Intervention	Outcome	Result
Castellini et al. (2017) (79)	289	People in hospital	STRATIFY fall risk assessment tool	Falls in hospital	Sensitivity 36% Specificity 36%
Latt et al. (2016) (80)	217	Older people in hospital	Ontario modified St Thomas's Risk Assessment Tool in Falling Elderly Inpatients	Falls in hospital	Sensitivity 80% Specificity 37%
Latt et al. (2016) (80)	217	Older people in hospital	Northern Hospital modified St Thomas's Risk Assessment Tool in Falling Elderly Inpatients	Falls in hospital	Sensitivity 85% Specificity 51%
Latt et al. (2016) (80)	217	Older people in hospital	St Thomas's Risk Assessment Tool in Falling Elderly Inpatients	Falls in hospital	Sensitivity 80% Specificity 61%

Palese et al. (2016) (81)	1,464	Older people in hospital	Conley Scale	Falls	Sensitivity 60% Specificity 56%
Peel et al. (2018) (82)	393	Older people in hospital	InterRAI acute care falls risk score	Falls	AUC 70%
Peel et al. (2018) (82)	393	Older people in hospital	St Thomas Risk Assessment Tool In Falling Elderly	Falls	AUC 64%
Said et al. (2017) (83)	130	Older people in hospital	Austin Health Falls Risk Screening Tool	Falls	Specificity 46% Positive predictive value 6%
Said et al. (2017) (83)	130	Older people in hospital	The Northern Hospital Modified St Thomas's Risk Assessment Tool	Falls	Specificity 35% Positive predictive value 7%
Thomas et al. (2016) (84)	931	Older people in hospital (rehabilitation service)	Morse Fall Scale	Falls	AUC 60%
Thomas et al. (2017) (84)	932	Older people in hospital (rehabilitation service)	Casa Colina Fall Risk Assessment Scale	Falls	AUC 71%
Yazdani and Hall (2017) (85)	33,058	People having in-hospital falls risk assessment	Morse Fall Scale plus Medication Fall Risk Score	Falls	AUC 80% Sensitivity 82% Specificity 67%
Yazdani and Hall (2017) (85)	33,059	People having in-hospital falls risk assessment	Morse Fall Scale	Falls	AUC 78% Sensitivity 81% Specificity 61%
n = number of participants. AUC = area under the curve.					

Table 11 Interventions for people in hospital

Authors (Year)	Type	n	Population	Intervention	Comparator	Outcome	Result
Cameron et al. (2018) (21)	SR-C	28,649, 2 studies	Older people in hospital	Multifactorial interventions	Unspecified control	Rate of falls	No effect of intervention
Cameron et al. (2018) (21)	SR-C	39,889, 3 studies	Older people in hospital	Multifactorial interventions	Unspecified control	Risk of falling	No effect of intervention
Cameron et al. (2018) (21)	SR-C	215, 2 studies	Older people in hospital	Additional physiotherapy	Unspecified control	Rate of falls	No effect of intervention
Cameron et al. (2018) (21)	SR-C	83, 2 studies	Older people in hospital	Additional physiotherapy	Unspecified control	Risk of falling	Improved with intervention
Cameron et al. (2018) (21)	SR-C	28,649, 2 studies	Older people in hospital	Bed and chair sensor alarms	Unspecified control	Rate of falls	No effect of intervention
Hshieh et al. (2018) (86)	SR	-; 3 studies	Older people in hospital	Delirium prevention intervention	Unspecified control	Falls	Improved with intervention

Marques et al. (2017) (87)	SR	0 studies	Older people in hospital	Bedrails	Unspecified control	Falls	No studies found
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n = number of participants. SR-C = Cochrane review. SR = systematic review.

Research recommendations

What environmental adaptations can be made in existing inpatient units, and should be considered when inpatient units are built, to reduce the risk of falls and injuries in older inpatients? [2013]

Summary of findings

No new evidence relevant to the research recommendation was found and no ongoing studies were identified.

Which risk factors for falling that can be treated, improved or managed during the hospital stay are most prevalent in older patients who fall in inpatient settings in the UK? [2013]

Summary of findings

No new evidence relevant to the research recommendation was found and no ongoing studies were identified.

What are the causes of unwitnessed falls among older inpatients? [2013]

Summary of findings

No new evidence relevant to the research recommendation was found and no ongoing studies were identified.

How can falls among older inpatients be prevented? Which patients are most likely to benefit from falls prevention interventions, and does the effectiveness of interventions relate to the patient's length of stay? [2013]

Summary of findings

No new evidence relevant to the research recommendation was found and no ongoing studies were identified.

Further analysis of existing trial data to identify which components of multifactorial interventions are important in different settings and amongst different patient groups. [2004]

Summary of findings

[New evidence](#) suggests that multifactorial interventions (individual components adapted according to risk) may not reduce falls, but and multiple component interventions (using the same interventions on all people irrespective of risk) may reduce falls. This section of the guideline has been proposed for updating.

Future trials designed and analysed with the intention of identifying cost effective components of multifactorial programmes for particular groups of older people in different settings. [2004]

Summary of findings

[New evidence](#) suggests that multifactorial interventions (individual components adapted according to risk) may not reduce falls, but and multiple component interventions (using the same interventions on all people irrespective of risk) may reduce falls. This section of the guideline has been proposed for updating.

Evaluation of multi-agency falls prevention programmes to measure the impact of these programmes on reducing falls, injurious falls and fractures in older people. [2004]

Summary of findings

No new evidence relevant to the research recommendation was found and no ongoing studies were identified.

Falls prevention trials with a focus on injury reduction, such as fracture outcomes and fall related outcomes. [2004]

Summary of findings

No new evidence relevant to the research recommendation was found and no ongoing studies were identified. However, in this surveillance review we focused on falls outcomes rather than fractures outcomes when selecting studies for inclusion, so evidence in this area may exist.

Research on the optimal methods of risk assessment for falls in older people and evaluation of whether fall-prone individuals can be risk stratified, in terms of whom will most benefit from assessment and intervention. [2004]

Summary of findings

[New evidence](#) on risk assessment tools was identified and this section of the guideline has been proposed for updating.

Trials investigating the most effective strategy for preventing falls in older people with cognitive impairment and dementia. [2004]

Summary of findings

[One study](#) indicated that nutritional support may reduce falls in older people with Alzheimer's disease who are living with a spouse.

UK-based cost effectiveness studies of falls prevention interventions. [2004]

Summary of findings

[One study](#) indicated that a podiatry falls reduction intervention had 65% probability of being cost effective at a threshold of £30,000 per QALY gained.

Trials to investigate the effectiveness of hip protectors compared with other fracture prevention interventions in older people at high risk of falling. [2004]

Summary of findings

No new evidence relevant to the research recommendation was found and no ongoing studies were identified.

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