



## **Appendix 3**



**Evidence to Action Tables**

## Working group 1: Assessment and Risk Factors

### Recommendations for Working Group 1: Gait and balance assessments tools to assess risk for falls

**Recommendation 1 (Stratification).** We recommend including Gait Speed for predicting falls risk.

**GRADE: 1A**

As an alternative the Timed Up and Go Test can be considered, although the evidence for fall prediction is less consistent. **GRADE: 1B**

**Recommendation 2 (Assessment).** We recommend that Gait and Balance should be assessed as part of the risk assessment of falls. **GRADE: 1B**

<i>Population:</i>	Older adults	<i>Objective:</i> To make an evidence-based recommendation through critical appraisal of the existing evidence (umbrella review) on assessments of gait and balance to predict falls in older people.		
<i>Intervention:</i>	Gait and balance assessments			
<i>Comparison:</i>	Usual care			
<i>Main outcomes:</i>	Falls, falls risk			
<i>Setting:</i>	Community-dwelling older adults			
<i>Perspective:</i>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>		

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Fall risk	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>			OR and RR not provided for each outcome  Those studies were cited from the umbrella review	
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	DOR=Diagnostic odds ratio
		Gait Speed (GS) <sup>2</sup>	N=1517	Highest vs lowest gait speed	RR: 0.23 (0.11-0.5)	
		Gait speed (Fractures) <sup>2</sup>	N=7575	Highest vs lowest gait speed	RR: 1.4 (1.1-1.6)	
		Timed Up and Go (TUG) [Park <sup>12</sup> ] [Barry <sup>10</sup> ]	N=427 <sup>12</sup>  N=2314 <sup>10</sup>		DOR: 3.99 (1.51 – 10.51) <sup>12</sup> OR: 1.01 (1.00 – 1.02) <sup>10</sup>	
		Berg Balance Scale (BBS) [Park <sup>12</sup> ]	N=570		DOR: 29.73 (7.81 – 113.17)	
		Chair Stand Test (CST)			* No RR or OR calculated for this test	
		One Leg Stance (OLS)			* No RR or OR calculated for this test	
		Functional Reach Test (FR)			* No RR or OR calculated for this test	

			<p>Dual Task (DT) Assessments [Beauchet<sup>21</sup>]</p>	<p>N=15 (studies)</p>		<p>Retrospective studies Pooled OR: 1.62 (0.96 – 2.72) Prospective studies Pooled OR: 6.84 (3.06 – 15.28) All studies Pooled OR: 5.3 (3.1 – 9.1)</p>	

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li><input checked="" type="radio"/> <b>No studies</b></li> <li><input type="radio"/> Very low</li> <li><input type="radio"/> Low</li> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> High</li> </ul>	<p>No studies outlining cost of the intervention</p>	
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li><input type="radio"/> Favours the option</li> <li><input type="radio"/> Probably favours the option</li> <li><input type="radio"/> Does not favour either</li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li><input type="radio"/> Varies</li> <li><input checked="" type="radio"/> <b>No studies</b></li> </ul>	<p>No studies outlining cost of the intervention</p>	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 1. We recommend including Gait Speed (GS) for predicting falls risk. GRADE: 1A As an alternative the Timed Up and Go Test can be considered, although the evidence for fall prediction is less consistent. GRADE: 1B Recommendation 2. We recommend that Gait and Balance should be assessed as part of the risk assessment of falls. GRADE: 1B				
Justification	Evidence for this recommendation has emerged from a review of the literature, with specifically an umbrella review of the available evidence. <sup>10</sup>				
Subgroup considerations	GS is an important measure in the comprehensive geriatric assessment, within all clinical settings, for predicting falls and for the purposes of developing risk profiles for older patients. <sup>23</sup> There is some evidence, from one subgroup analysis, that the TUG may have a role in fall prediction for older adults with lower function. <sup>24</sup> One review reported that the BBS may predict falls in a stroke clinic population. <sup>25</sup> One review reported that the FR may predict falls in older adults with cognitive impairment. <sup>22</sup> There is well-established evidence indicating that dual task gait (slowing speed or higher dual task cost) has the ability to predict dementia; <sup>26</sup> similarly, the best available evidence suggested that dual task testing can predict falls, although the optimal type of dual task test is still unclear. <sup>10</sup>				
Implementation considerations	GS is a suitable test that can easily be implemented in the standard clinical evaluation of older adults, <sup>1</sup> due to its ease and efficiency of administration, low cost, and reliability. GS can also predict other important health-related outcomes. <sup>2,27,28</sup> Positive results have been found for a 4-meter gait speed assessment, which is also the recommended length of measurement in a systematic review from the IANA task force, which reported that gait speed was a strong and consistent predictor of adverse outcomes in community-dwelling older adults. <sup>2</sup>				
Monitoring and evaluation	For monitoring the effectiveness of interventions to reduce falls, it is important to use the established minimal level of change of the assessments, and consideration should be given to clinical meaningful changes.				
Research Priorities	1. Further research is needed to evaluate how different tools combining balance and physical functional assessment like the Short Physical Battery (SPPB) can predict falls and be clinically applied. The SPPB is increasingly being used in clinical and research settings; however the umbrella review was unable to determine its predictive ability, as it was not reported in the included reviews. <sup>10</sup>				



2. Current evidence shows that DT assessment has the ability to predict falls; however future research defining the optimal DT protocol with regards to fall prediction is still warranted.
3. The combination of the best assessment tools needs to be defined for different settings (e.g., community, outpatient clinic, acute care, long term care), specific clinical characteristics of the older adult (e.g., cognitive impairment, stroke, Parkinson's disease), different levels of functional status, and different levels of frailty.
4. There is increasing interest and research on developing fall prediction models, which combine data from different domains to calculate falls risk. Research focusing on a combination of different fall risk factors in these prediction models is warranted.<sup>29,30</sup>
5. Future fall prediction research should focus on feasibility and cost-effectiveness of assessments.
6. Future fall prediction research should also include patient and public involvement. The development and implementation of relevant assessment tools should take into account patients' and public values and preferences.

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## Working Group 2: Polypharmacy, Fall Risk Increasing Drugs, and Falls

### Recommendations for Working Group 2: Polypharmacy, Fall Risk Increasing Drugs, and Falls

**Recommendation 1 (Assessment): We recommend assessing for fall history and the risk of falls before prescribing potential fall risk increasing drugs (FRIDs) to older adults. GRADE: 1B**

<b>Population:</b>	Older adults aged $\geq 65$ years	<i>Objective: Adults of 65 years and older have an increased risk of falls. Several central nervous system (CNS) drugs and cardiovascular drugs are strongly associated with an increased risk of falls in older adults. A pragmatic prevention approach to prevent falls is to identify older adults at risk for falls and try to find a treatment option that is safer than FRID, available and clinically suitable for older adults. The objective was to summarize the literature regarding FRIDs as risk factors for falling.</i>		
<b>Intervention:</b>	Assessment of fall history and fall risk prior to prescription of FRIDs			
<b>Comparison:</b>	Prescription of FRIDs, (non)-pharmacological option for treatment			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Any setting			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE):</i>				
		<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>			
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Antipsychotics				OR: 1.54 (1.28 - 1.85)
		Antidepressants				OR: 1.57 (1.43 - 1.74)
		Benzodiazepines				OR: 1.42 (1.22 - 1.65)
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Antipsychotics			OR: 1.54 (1.28 - 1.85)	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	No mention of associated costs for the intervention.
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	No mention in regards to the effects of the intervention on health equity.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		



Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should assessing for fall history and the risk of falls before prescribing potential fall risk increasing drugs (FRIDs) to older adults be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 1 (Assessment): We recommend assessing for fall history and the risk of falls before prescribing potential fall risk increasing drugs (FRIDs) to older adults. GRADE: 1B				
Justification	There is strong evidence that certain medication use can increase fall risk in older adults. Avoiding prescriptions for FRIDs if a suitable and safer treatment option is available for older adults can significantly reduce fall risk. If FRIDs prescription is needed, appropriate dosage and dosing time should be carefully considered.				
Subgroup considerations	Falling aggravated by the use of FRIDs is a critical issue for multi-morbid older adults and therefore this recommendation is valid for all settings: community, hospital and long-term care (including residential care and nursing homes).				
Implementation considerations	In prevention of falls due to FRIDs, no prescriptions if safer and suitable (non)-pharmacological alternatives are available could be a successful strategy to prevent falls in older adults. There are tools available to guide appropriate prescribing such as the STOPP/START, STOPPFall, STOPPFrail, Beers criteria, FORTA, and Web-based Meds75+. <sup>1-5</sup>				
Monitoring and evaluation	<p>When prescribing medications in older adults, assessment for fall risk is always needed and the knowledge of FRIDs can help guide clinicians to weigh risks and benefits of treatments and thus, provide safer treatments for older adults.</p> <p>In addition, regular medication review is important due to unstable health conditions in older people. Over time, the benefits versus risks of medication change, highlighting the need for regular reassessment. In addition, the complexity of healthcare systems with multiple prescribers demands regular medication reviews. As FRIDs review is an essential part of the medication review, their regularity will help to keep the exposure to FRIDs as short as clinically indicated. This can reduce fall risk in older adults. This is particularly important for subgroups of frail older adults, who are especially at increased risk of falls,<sup>11</sup> and ADEs.<sup>12</sup> Thus medication review (including FRIDs review) is preferably performed every 6 months in frail older adults as their health situation can alter quickly over time. In non-frail older adults, medication review (including FRIDs review) is preferably performed at least annually.</p>				

Research Priorities	None
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## Recommendations for Working Group 2: Polypharmacy, Fall Risk Increasing Drugs, and Falls

**Recommendation 2 (Assessment): We recommend the use of a validated, structured screening and assessment tool to identify FRIDs when performing a general medication review or medication review targeted to falls prevention. GRADE: 1C**

<b>Population:</b>	Older adults aged $\geq 65$ years	<i>Objective: Older adults 65 years and older have an increased risk of falls. Polypharmacy and use of certain drugs are strongly associated with increased risk for falls in older adults (particularly central nervous system (CNS) drugs and cardiovascular drugs). The objective was to review the literature to evaluate if a structured assessment of FRIDS e.g., by utilizing a screening and assessment tool within a medication review is warranted.</i>		
<b>Intervention:</b>	Structured screening and assessment tool			
<b>Comparison:</b>	Continued prescription of FREDs			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Any setting			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕○○○ VERY LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>● <b>Very low</b></li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>			Lack of supporting evidence for the recommendation	
		<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>					
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	No studies indicating any associated cost of the intervention.
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	No mention on the effects of the intervention on health equity.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	The implementation of a routine medication review should not pose to much difficulty to implement.	
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**Should the use of a validated, structured screening and assessment tool to identify FRIDs when performing a regular routine medication review or medication review targeted to falls prevention in older adults be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 2 (Assessment): We recommend the use of a validated, structured screening and assessment tool to identify FRIDs when performing a general medication review or medication review targeted to falls prevention. GRADE: 1C				
Justification	There is limited evidence that assessment of FRIDs within medication review and deprescribing of FRIDs as a unifactorial intervention can successfully reduce falls. However, incorporating a medication review in a holistic multifactorial fall risk assessment with a view to deprescribing of FRIDs, where appropriate, is warranted. <sup>26</sup> In addition, deprescribing based on comprehensive medication review may reduce mortality and potentially inappropriate medications and it has been suggested that deprescribing could be safe, feasible, well tolerated and can lead to important benefits in frail individuals <sup>29, 30</sup> . A structured approach is included in the definition of medication reviewing as determined by among others the NICE guidelines. <sup>31</sup> Guideline recommendations on the structured approach include advice to use an appropriate tool that is easy to use. <sup>32</sup>				
Subgroup considerations	Inappropriate prescribing is considered an important issue for multi-morbid older people and therefore this recommendation is valid for all settings: community, hospital, and long-term care (including residential care and nursing homes). <sup>33-35</sup>				
Implementation considerations	Deprescribing is often a challenging process. Therefore, an assessment and deprescribing tool can help to support rational deprescribing. Utilizing screening tools such as STOPPFall could potentially improve the quality of medication reviews and appropriate deprescribing in older people at risk of falls. <sup>1</sup>				
Monitoring and evaluation	A structured assessment of FRIDs, within a medication review should be provided regularly i.e., at least annually.				
Research Priorities	STOPPFall has been shown to be predictive of falls in a hospital setting. Further studies are needed to demonstrate the effectiveness of STOPPFall and other deprescribing tools in falls prevention.				



## Recommendations for Working Group 2: Polypharmacy, Fall Risk Increasing Drugs, and Falls

### Recommendation 3 (Interventions): We recommend that a medication review and appropriate deprescribing of fall-risk increasing drugs (FRIDs) should be part of multidomain falls prevention interventions. GRADE: 1B

<b>Population:</b>	Older adults aged $\geq 65$ years	<p><b>Objective:</b> One of the typical components of a multifactorial fall's prevention strategy is the identification and rational deprescribing of certain medications. The rationale behind this intervention is the establishment of specific medications as risk factors for falls and the reversibility, after deprescribing, of possible adverse effects leading to falls such as the presence of orthostatic hypotension or sedation.</p> <p>The term "deprescribing" has been described as "the process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of managing polypharmacy and improving outcomes".<sup>36</sup> The objective was to assess whether medication review and deprescribing of FRIDs should be included in the multifactorial falls prevention intervention.</p>		
<b>Intervention:</b>	Medication review and deprescription of FREDs			
<b>Comparison:</b>	multifactorial fall prevention interventions			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Any setting			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Exercise (exerc)	Important	⊕⊕⊕○ MODERATE	
			Assistive technology (assist)	Important	⊕⊕⊕○ MODERATE	
			Environmental assessment and modification (envir)	Important	⊕⊕⊕○ MODERATE	
			Quality improvement strategies (qualt)	Important	⊕⊕⊕○ MODERATE	
			Basic fall risk assessment (brisk)	Important	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE):</i>			*Rate ratio
		<b>Outcome</b>	<b>Nº of patients</b>		
			<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>
		Assist + brisk			RR: 0.52 (0.30–0.90)
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	envir+assist+qualt+hypot+brisk			RR: 0.62 (0.43–0.88)
		qualt+brisk			RR: 0.84 (0.73–0.96)
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	exerc+envir+assist+qualt+brisk			RR: 0.85 (0.74–0.98)
		exerc+management of urinary incontinence +envir+assist+qualt+brisk			RR: 1.58 (1.01–2.48)
		envir+assist+qualt+management of orthostatic hypotension (hypot)+brisk*			RR: 0.42 (0.30–0.58)
		exerc+envir+assist+hypot+brisk*			RR: 0.73 (0.59–0.92)
		exerc+qualt+hypot+brisk*			RR: 2.08 (1.34–3.25)

			exerc+fluid or nutrition therapy +envir+assist+brisk*			RR: 1.84 (1.14–2.97)	
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	<p>No studies specifically outlining the cost of each combination o assessments, however there certainly will be some degree of cost for some assessments.</p>	
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favoureither</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	No mention of the interventions impact on health equity	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
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**Should medication review and appropriate deprescribing of fall-risk increasing drugs (FRIDs) should be part of the multifactorial fall's prevention interventions be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ○	Strong recommendation for the intervention ●
Recommendation	Recommendation 3 (Interventions): We recommend that a medication review and appropriate deprescribing of fall-risk increasing drugs (FRIDs) should be part of multidomain falls prevention interventions. GRADE: 1B				
Justification	Medication review and deprescribing should be a standard component of the multifactorial approach. Due to very heterogeneous approaches and research populations, it is difficult to determine the optimal content of the FRIDs deprescribing component, since in studies this varied between single drug group deprescribing (e.g., benzodiazepines) to a broad deprescribing approach. <sup>44,45</sup> In general, when conducting a medication review as a part of a multidomain intervention, deprescribing of FRIDs can be performed safely in older people at risk of falls. <sup>46</sup> Few adverse withdrawal effects occur, and if symptoms re-occur, they can be safely treated by restarting the withdrawn medication or if possible a safer alternative. <sup>46,47</sup> There are some data available on the rate of re-prescribing of FRIDs and depending on the drug groups, this varies between 0-50%. <sup>46,47</sup>				
Subgroup considerations	Studies have shown that the effect of FRIDs on fall risk is likely dependent on patient characteristics as explained above. <sup>43</sup> A medication review will not lead to similar recommendations in different individuals due to the heterogeneity in the older population and their respective pharmacotherapy. Patient preferences should be incorporated into treatment decisions via SDM. As the level of evidence on the benefit versus risk ratio of medications is low in this patient population, most decisions about deprescribing or continuing are preference-sensitive. SDM can result in better-informed patients who opt for deprescribing more often. Hence, SDM is essential component of deprescribing.				
Implementation considerations	In general, the barriers and enablers for deprescribing can be categorized into environmental (e.g., regulatory, financial, policy), healthcare organization, provider, and patient/public related factors. <sup>48</sup> Lack of knowledge and skills is a significant barrier to healthcare professionals' capacity to implement effective fall-prevention approaches. <sup>49</sup> The withdrawal of FRIDs and not being able to predict the outcome of changes in pharmacotherapy are perceived as challenging by many physicians. <sup>50</sup> In addition, some older adults are also hesitant to stop their medication, fearing withdrawal reactions and relapse of their disease. <sup>51</sup> Finally, successful deprescribing of FRIDs may be short-lived as patients or doctors may initiate their resumption, especially for psychotropics. <sup>52</sup> For the long-term success of deprescribing, provision of education, monitoring, support, and documentation are crucial. <sup>1</sup> For successful implementation, education of both patients, family members/caretakers and health care professionals is essential. Also structured follow-up of symptoms is warranted. <sup>9,26</sup> Given the complexity of the intervention, supporting structured tools (such as STOPPFall) are warranted accompanied with appropriate training. <sup>49,53</sup> Given the complexity of the intervention, allocation of sufficient time and resources is necessary to optimize success rate and				

	effectiveness.
Monitoring and evaluation	Long-term success of deprescribing can be increased by provision of monitoring, support, and documentation. For future studies, more comparability is warranted in terms of targeted medication classes. For successful long-term effect of the deprescribing intervention, a medication review should be provided regularly, at least yearly as a minimum interval. For frail older persons, this is preferably done every 6 months as their health situation can alter quickly over time.
Research Priorities	None



## Recommendations for Working Group 2: Polypharmacy, Fall Risk Increasing Drugs, and Falls

**Recommendation 4 (Interventions): We recommend that in long-term care residents, the falls prevention strategy should always include rational deprescribing of fall-risk-increasing drugs.**

**GRADE: 1C**

<b>Population:</b>	Older adults aged $\geq 65$ years	<p><b>Objective:</b> One of the typical components of a multifactorial fall's prevention strategy is the identification and deprescribing of certain medications. The rationale behind this intervention is the establishment of specific medications as risk factors for falls and the reversibility of possible adverse effects leading to falls such as presence of orthostatic hypotension, unsteady gait or sedation after deprescribing.</p> <p>Both in studies as well as in clinical practice, the intervention of deprescribing of FRIDs differs largely, varying from deprescribing a single drug group (such as sedatives) or deprescribing any drug with possible fall-related ADEs with the aim of reducing fall risk. Thus, the objective was to assess deprescribing and medication review interventions as a single intervention in falls prevention. The intervention could be any deprescribing or medication review intervention.</p>		
<b>Intervention:</b>	Deprescribing of FREDs as a standalone intervention			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	All settings			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕○○ LOW	
			Community	Critical	⊕⊕○○ LOW	
			Hospital	Critical	⊕⊕○○ LOW	
			Long-term care	Critical	⊕⊕○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>					

	How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>● <b>Small</b></li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE): 1C</i>			
	How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>N<sub>o</sub> of patients</b>		<b>Effect</b>
				<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>
			Community (Number of fallers)			RR: 1.05 (0.85 – 1.29) I <sup>2</sup> = 0%
			Community (Number of injurious fallers)			RR: 0.95 (0.70 – 1.27) I <sup>2</sup> = 0%
		Hospital (number of fallers)			RR: 0.97 (0.74 – 1.28) I <sup>2</sup> = 15% RR: 0.50 (0.07 – 3.50) I <sup>2</sup> = 72%	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Long-term care (number of fallers)			RR: 0.86 (0.72 – 1.02) I <sup>2</sup> = 0%	
		Long-term care (number of falls)			RR: 0.93 (0.64 – 1.35) I <sup>2</sup> = 92%	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 4: We recommend that in long-term care residents, the falls prevention strategy should always include rational deprescribing of fall-risk-increasing drugs. GRADE: 1C				
Justification	In a systematic review and meta-analysis on the effectiveness of deprescribing as a single intervention in falls prevention, no significant associations between medication reviews in any of the geriatric care settings and fall outcomes were found. <sup>37</sup> However, there was a trend for a lower number of fallers in the meta-analysis assessing medication reviews in long-term care, possibly indicating that in a frail subgroup of older adults, rational deprescribing might be effective also as a single intervention. Furthermore, several other studies with heterogeneous interventions and results not included in the meta-analyses were identified. Since the conducted studies are very heterogeneous, it is difficult to estimate the effect of deprescribing as a single intervention. The health benefits likely outweigh the harms.				
Subgroup considerations	The recommendation is valid for the long-term care setting (including residential care and nursing homes). Since there was a trend for a lower number of fallers in the meta-analysis assessing medication reviews in long-term care only. For frail subgroups residing in long-term care rational deprescribing might be performed as a stand-alone intervention.				
Implementation considerations	The interventions should involve the individual, their representatives, and healthcare professionals to focus on the multidisciplinary team-centred approach to facilitate the implementation. Education and engagement are essential for the implementation uptake of a complex intervention such as a medication review. <sup>40</sup> For successful implementation, education of both patients and health care professionals is essential. <sup>18</sup> Given the complexity of the intervention, supporting structured tools (such as STOPPFall) are warranted accompanied with appropriate training. <sup>1, 41</sup> Also, allocation of sufficient time and resources is necessary to optimize success rate and effectiveness.				
Monitoring and evaluation	Long-term success of rational deprescribing can be increased by provision of monitoring, support, and documentation. For successful long-term effect of the deprescribing intervention, a medication review should be provided regularly, at least yearly.				

Research Priorities	For future studies, more comparability is warranted in terms of targeted medication classes.
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## Working Group 3: Cardiovascular Risk Factors for Falls

### Recommendations for Working Group 3: Cardiovascular Risk Factors for Falls

**Recommendation 1 (Assessment):** We recommend, as part of a multifactorial falls risk assessment, that a cardiovascular assessment that initially includes cardiac history, auscultation, lying and standing orthostatic blood pressure, and surface 12-lead electrocardiogram should be performed. **GRADE 1B.**

**Recommendation 2 (Assessment):** In the absence of abnormalities on initial cardiovascular assessment, no further cardiovascular assessment is required, unless syncope is suspected (i.e. described or witnessed syncope/pre-syncope or recurrent unexplained falls). **GRADE: 1C**

<i>Population:</i>	Older adults aged $\geq 60$ years	<i>Objective:</i> The main goal of these recommendations is to assist health care professionals in the cardiovascular assessment and management of older patients who are at risk of falling or have fallen.		
<i>Intervention:</i>	A geriatric multidimensional assessment			
<i>Comparison:</i>	Comparison not applicable			
<i>Main outcomes:</i>	Falls			
<i>Setting:</i>	Any setting			
<i>Perspective:</i>	Cardiovascular problems and risk of falls in community dwelling older adults			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	<ol style="list-style-type: none"> <li>1. Cardiovascular disorders such as orthostatic hypotension, bradycardia, tachycardia and structural heart problems have all been implicated to varying degrees in falls risk; therefore the minimum tests required to assess these cardiovascular disorders are cardiac auscultation (to detect underlying murmurs), orthostatic blood pressure measurement (to detect orthostatic hypotension) and surface electrocardiogram (to detect rate and rhythm abnormalities).</li> <li>2. There is strong consensus that the diagnosis of carotid sinus syndrome (CSS) requires both the reproduction of spontaneous symptoms during carotid sinus stimulation (CSM) and clinical features of spontaneous syncope or unexplained falls compatible with a reflex mechanism. This is consistent with the recommendation of 2018 ESC</li> </ol>	Recommendations based on expert opinions.

			<p>guidelines.<sup>4</sup> Patients with falls due to CSS may be unaware of loss of consciousness produced during CSM. The quality of evidence is moderate and is given by studies of ECG correlation between CSM and spontaneous events, and indirectly by studies of efficacy of cardiac pacing. Further research is likely to have an important impact on our confidence in the estimation of effect and may change the estimate.</p> <p>3. Orthostatic hypotension is consistently associated with falls, when assessed using the beat to beat methods for blood pressure measurement. Beat to beat methods are superior to traditional oscillometer and sphygmomanometer methods for the assessment of orthostatic hypotension in the context of falls risk. The association between falls and orthostatic hypotension measured using oscillometer or sphygmomanometer is not consistent.</p>	
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<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			Ratings are based on expert opinions.
	What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>				

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>	<b>Summary of findings (GRADE):</b>				
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>	<b>Outcome</b>	<b>Nº of patients</b>		<b>Effect</b>	
			<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	
		Non-accidental falls <sup>14</sup>	211 participants. Intervention and control N/A (observational study: case-control)		Atrial fibrillation associated with falls: OR 1.16 [1.0–2.7] p=0.04	
		Any fall <sup>8</sup>	401 participants. Intervention and control N/A (observational study: cross-sectional)		Atrial fibrillation associated with falls: OR 1.98 (1.08-3.63) p=0.025	
		Any fall <sup>18</sup>	733 participants. Intervention and control N/A (observational study: cross-sectional)		Congestive heart failure associated with falls: RR 2.16 (1.15-4.04)	
		Any fall *(Xu 2015)	447 participants. Intervention and control N/A (observational study: cohort study)		Stroke associated with falls: RR 2.43 1.51–3.93 p<0.001	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> </ul>					* Xu W, Chen D-W, Jin Y-B, Dong Z-J, Zhang W-J, Chen J-W, et al. Incidence and related clinical factors of falls among older Chinese veterans in military communities: a prospective study. Journal of physical therapy science. 2015;27(2):331-9.

		<ul style="list-style-type: none"><li>○ Varies</li><li>● <b>Don't know</b></li></ul>					
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>	<p>Not measured.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>		
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should a cardiovascular assessment should be a part of a multifactorial falls risk assessment to determine possible cause and to reduce falls risks in older fallers be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	<p>Recommendation 1: We recommend, as part of a multifactorial falls risk assessment, that a cardiovascular assessment that initially includes cardiac history, auscultation, lying and standing orthostatic blood pressure, and surface 12-lead electrocardiogram should be performed. GRADE 1B.</p> <p>Recommendation 2: In the absence of abnormalities on initial cardiovascular assessment, no further cardiovascular assessment is required, unless syncope is suspected (i.e. described or witnessed syncope/pre-syncope or recurrent unexplained falls). GRADE 1C.</p>				
Justification	There is evidence suggesting that an association between cardiovascular disease and risk of falls in older adults.				
Subgroup considerations					
Implementation considerations					
Monitoring and evaluation	<ol style="list-style-type: none"> <li>1. Bradycardia or tachyarrhythmia can be captured with a surface electrocardiogram, telemetry or ambulatory heart rate monitoring – either by external loop recordings (if events are frequent) or internal loop recordings (for infrequent events). There is also an emerging role for the use of wearable devices over the coming years.</li> <li>2. If rate or rhythm disorders are intermittent it is likely that abnormalities will not be captured by a single surface electrocardiogram or 24 hour monitoring and longer term monitoring, likely to capture a fall related rate or rhythm change, is required.<sup>19</sup></li> <li>3. In many cases monitoring may be required over many months in which case an implantable monitoring device is preferred.<sup>123</sup></li> <li>4. We suggest that the assessment for orthostatic hypotension should be conducted as follows: Patients should be supine for at least 5 minutes, with baseline BP taken at this point. On standing, a first BP measurement should be taken as soon as possible (40 – 60 seconds), and two further readings at 1 and 3 minutes.<sup>124</sup></li> <li>5. We recommend that if there are signs suggestive of structural heart disease after auscultation or ECG an echocardiogram should be performed.</li> <li>6. In frail older people overall hypotension or post prandial hypotension may be associated with higher falls risk. New blood pressure targets are not</li> </ol>				



	<p>consistently associated with falls unless patients are frail.</p> <ol style="list-style-type: none"> <li>7. 24-hour ambulatory blood pressure measurement will assist in the evaluation of overall blood pressure variability and in determining the time periods during which blood pressure is excessively low.</li> <li>8. Another useful approach, to give the physician a more detailed overview of the patient's BP response to activities of daily living, may be to advise the patient to perform BP measurements at standardized times throughout the day, including pre and post meals, for a period of at least 2 weeks. We advise, where possible, to recreate the conditions that were associated with the fall.</li> </ol>
Research Priorities	Meta-analysis performed to compare the overall risk ratio and significance of cardiovascular diseases on fall risk.

## Recommendations for Working Group 3: Cardiovascular Risk Factors for Falls

**Recommendation 3 (Assessment): We recommend that the further cardiovascular assessment for unexplained falls should be the same as that for syncope, in addition to the multifactorial falls risk assessment. GRADE: 1A**

<b>Population:</b>	Older adults aged $\geq 60$ years	<b>Objective:</b> The main goal of these recommendations is to assist health care professionals in the cardiovascular assessment and management of older patients who are at risk of falling or have fallen.		
<b>Intervention:</b>	Not applicable			
<b>Comparison:</b>	Not applicable			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	All settings			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>	<ul style="list-style-type: none"> <li>● Drop attacks in older subjects are associated with high levels of morbidity and healthcare resource utilization. Attributable diagnoses are achievable in the majority of cases with a systematic investigative approach. The high diagnostic yield more than justifies the approach described (Perry S.W. 2004).</li> <li>● Amnesia for loss of consciousness (A-LOC) is common in Vasovagal syncope. Although more prevalent, it is not unique to older age-groups. Absence of syncope associated bradycardia during head-up tilt testing predicts for A-LOC (O'Dwyer, C. 2010).</li> <li>● Patients with carotid sinus syndrome have similar rates of witnessed loss of consciousness during laboratory testing regardless of symptoms. However, those presenting with falls are far less likely to perceive any disturbance of consciousness than those with syncope, showing for the first time the manner in which such patients manifest symptoms. Cognitive impairment does not explain the amnesia for loss of consciousness seen in fallers with carotid sinus syndrome (Perry S.W. 2005).</li> </ul>	



<b>Benefits and harms</b> (see below)	Is there Important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕○○ LOW	
			Loss of consciousness due to changes in body posture	Critical	⊕⊕○○ LOW	
					○○○○ MODERATE	
	What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>			○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	

<input type="checkbox"/> How substantial are the desirable anticipated effects of the intervention? Large <ul style="list-style-type: none"> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> Small</li> <li><input checked="" type="radio"/> <b>Trivial</b></li> <li><input type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	<p><i>Summary of findings (GRADE): 1A</i></p>	<p>As the intervention is an assessment, there is very little to no benefit or harm to the patient.</p>
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		Outcome	N <sup>o</sup> of patients		Effect	
			Intervention	Control	Relative / Absolute (95% CI)	
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li><input checked="" type="radio"/> <b>Trivial</b></li> <li><input type="radio"/> Small</li> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> Large</li> <li><input type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	Unexplained falls <sup>94</sup>	1500 participants. Intervention and control N/A (observational study: cohort study)		OH(40) RR=1.6 (1.1-2.1) p<0.01. Sustained OH 1.6 (1.1,2.5) p<0.05	
		Unexplained falls <sup>95</sup>	4127 participants. Intervention and control N/A (observational study: cohort study)		OH(40) RR=1.5 (1.0-2.3), p=0.04. OH RR: 1.8 (1.1-3.1) p<0.05	
		Unexplained falls <sup>42</sup>	523 participants. Intervention and control N/A (observational study: cohort study)		OR=2.3 (1.1-4.9), p<0.05	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li><input type="radio"/> Favours the option</li> <li><input type="radio"/> Probably favours the option</li> <li><input checked="" type="radio"/> <b>Does not favour either</b></li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li><input type="radio"/> Varies</li> </ul>					

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	<p>When a fall related to a syncope occurs patients can suffer fall related injuries, which can increase risk of hospitalizations and death.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li><input checked="" type="radio"/> <b>No studies</b></li> <li><input type="radio"/> Very low</li> <li><input type="radio"/> Low</li> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> High</li> </ul>		
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li><input type="radio"/> Favours the option</li> <li><input type="radio"/> Probably favours the option</li> <li><input type="radio"/> Does not favour either</li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li><input type="radio"/> Varies</li> <li><input checked="" type="radio"/> <b>No studies</b></li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	No studies outlining the effects of the intervention on health equity.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	No studies.	

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		
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**Should the assessment of unexplained falls should be the same as that for unexplained syncope. be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 3 (assessment): We recommend that the further cardiovascular assessment for unexplained falls should be the same as that for syncope, in addition to the multifactorial falls risk assessment. GRADE: 1A				
Justification	Assessment of syncope transient loss of consciousness important to set up target interventions in the case of unexplained falls.				
Subgroup considerations	None.				
Implementation considerations	Clinicians should insure that the assessment of unexplained falls be treated in the same manner as that of unexplained syncope.				
Monitoring and evaluation	Cardiovascular assessments.				
Research Priorities	Determination of associated costs with the implementation of these assessments, the impact on health equity, a meta-analysis showing the risk ratio and benefit of conducting these assessments.				



## Recommendations for Working Group 3: Cardiovascular Risk Factors for Falls

### Recommendation 4 (Intervention): We recommend that management of orthostatic hypotension should be included as a component of multidomain intervention in fallers. GRADE: 1A

<b>Population:</b>	Older adults aged $\geq 60$ years	<b>Objective:</b> To include management strategies for orthostatic hypotension as a component of multidomainl intervention to reduce falls in older adults.		
<b>Intervention:</b>	Management of orthostatic hypotension			
<b>Comparison:</b>	Lack thereof			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Community dwelling older adults			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	Many multifactorial fall prevention programs that have shown benefit for fall prevention <sup>125,126,127,128</sup> have included medication reduction and simplification to modify orthostatic blood pressure. Other strategies to address OH include hydration, elastic stockings, abdominal binders, and medications used to treat orthostatic hypotension (e.g., fludrocortisone and midodrine).However, no studies have focused on the benefits of these interventions alone for falls prevention.	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

<input type="checkbox"/> How substantial are the desirable anticipated effects of the intervention? Large <ul style="list-style-type: none"> <li>• <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p><i>Summary of findings (GRADE): 1A</i></p>	RR: rate ratio * Falls per person-week ** Any falls
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		Outcome	N <sup>o</sup> of patients		Effect
			Intervention	Control	Relative / Absolute (95% CI)
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>• <b>Small</b></li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Fall rate <sup>125</sup>	147	144	IRR: 0.69 (0.52 – 0.90) *
		Risk of falling <sup>126</sup>	184	213	IRR: 0.76 (0.58 – 0.98) **
		Risk of recurrent falls <sup>126</sup>	184	213	OR: 0.39 (0.23 – 0.66)
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>• <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>				

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li><input type="radio"/> No studies</li> <li><input type="radio"/> Very low</li> <li><input type="radio"/> Low</li> <li><input checked="" type="radio"/> <b>Moderate</b></li> <li><input type="radio"/> High</li> </ul>	<p>The associated cost of the intervention per fall prevented was \$12,392 compared favorably to the mean hospitalization cost of \$11,800<sup>125</sup>.</p>	
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li><input type="radio"/> Favours the option</li> <li><input checked="" type="radio"/> <b>Probably favours the option</b></li> <li><input type="radio"/> Does not favour either</li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li><input type="radio"/> Varies</li> </ul>	<p>A complete analysis of total and fall-related health care costs may show the intervention to result in a net cost savings<sup>125</sup>.</p>	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	Studies do not mention health equity.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should management of orthostatic hypotension should be included as a component of multidomain intervention in older fallers be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 4 (Intervention): We recommend that management of orthostatic hypotension should be included as a component of multidomain intervention in fallers. GRADE: 1A				
Justification	Many multidomain fall prevention programs that have shown benefit for fall prevention have included medication reduction and simplification to modify orthostatic blood pressure.				
Subgroup considerations	Other strategies to address OH include hydration, elastic stockings, abdominal binders, and medications used to treat orthostatic hypotension (e.g., fludrocortisone and midodrine).				
Implementation considerations	Distribution of intake of possibly culprit medications throughout the day, rather than in a single dose, may reduce medication related falls				
Monitoring and evaluation					
Research Priorities	Additional studies looking at the benefits of these interventions alone for fall prevention. Meta-analysis performed on to determine significance of the intervention.				

## Recommendations for Working Group 3: Cardiovascular Risk Factors for Falls

**Recommendation 5: We recommend that interventions for cardiovascular disorders identified during assessment for risk of falls should be the same as that for similar conditions when associated with syncope, in the addition to other interventions based on the multifactorial falls risk assessment.**

**GRADE: 1B**

<i>Population:</i>		<i>Objective: The main goal of these recommendations is to assist health care professionals in the cardiovascular assessment and management of older patients who have fallen or are at risk of falling. Note: Because of dependence of the assessment on subsequent intervention for effectiveness, it was more difficult to ascribe strength of recommendation to assessment recommendations alone. Likewise, prior to any intervention, assessment of an individual's risks and deficits is required to determine specific needs and, if necessary, to deliver targeted interventions. We present the recommendations for assessment and for intervention separately.</i>		
<i>Intervention:</i>				
<i>Comparison:</i>				
<i>Main outcomes:</i>				
<i>Setting:</i>				
<i>Perspective:</i>				
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	<ol style="list-style-type: none"> <li>1. There is a significant overlap between unexplained falls and syncope [3]. If unwitnessed falls are not due to slips or trips (i.e. are unexplained), it is possible that the patient experienced a syncopal event and displayed lack of awareness for LOC [4, 5]. Management of falls in such circumstances is the same as that for syncope [43, 129, 130].</li> <li>2. Our recommendation aligns with the 2018 European Society of Cardiology Taskforce for Syncope Guidelines state that 'Despite the lack of controlled trials and an overall modest quality of studies, there is strong consensus that the management of unexplained falls should be the same as that for unexplained syncope' [1].</li> <li>3. Interventions for bradycardic disorders (sinus node disease, atrioventricular conduction disorders, vasovagal syndrome and carotid sinus syndrome) and tachyarrhythmias (atrial fibrillation, supraventricular and ventricular tachycardia) include modification of culprit medications and, in some cases, implantable devices (such as pacemakers and ICDs) and are as per Syncope guidelines (i.e. European Cardiac Society Task force on Syncope). Cardiac pacing treats bradycardia. One RCT of</li> </ol>	<p><b>BACKGROUND</b></p> <p>The most common cardiovascular disorders associated with falls are orthostatic hypotension, bradyarrhythmia (e.g., sick sinus syndrome and atrioventricular block), tachyarrhythmias (such as atrial tachycardia including atrial fibrillation and ventricular tachycardia), carotid sinus hypersensitivity and vasovagal syndrome. Three mechanisms have been proposed. The first is transient loss of consciousness with amnesia in which the patient has no recollection of short episodes of syncope; this has been reported with orthostatic hypotension and carotid sinus hypersensitivity [64]. Given that many falls in older persons are not witnessed, these patients may present with a report of a fall rather than syncope. A second proposed</p>

			<p>cardiac pacing in community-dwelling older people who had recurrent unexplained falls, reported a significant reduction in fall rates at 12-month follow-up [131]. For the subset of older adults who meet the necessary diagnostic criteria, dual-chamber cardiac pacing for bradyarrhythmias (including carotid sinus hypersensitivity and conduction disorders) and treatment of tachyarrhythmia are components of a multidomain intervention designed to reduce the risk for falls.</p>	<p>mechanism is that of transient hypotensive episodes, due to primary hypotension or hypotension secondary to arrhythmias, which cause a person with comorbid gait and balance instability to lose balance and fall without frank syncope. Finally, falls and cardiovascular disorders may share pathophysiological substrates, such as vascular damage to neural pathways governing gait and balance, thereby predisposing to falls.</p>
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<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b><i>Relative importance of the main outcomes of interest:</i></b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>					

<input type="checkbox"/> How substantial are the desirable anticipated effects of the intervention? Large <ul style="list-style-type: none"> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE):</i>					
		<b>Outcome</b>	<b>Nº of patients</b>		<b>Effect</b>	Based on expert consensus, no clear data specified for summary of findings.
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>		<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

<b>Values and preferences</b>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	<b>Resources</b>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
<p>Does the cost effectiveness favour the intervention or the comparison?</p>		<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>○ Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		

<b>Feasibility</b>	Is the intervention feasible to implement?	<input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Uncertain <input type="radio"/> Probably yes <input type="radio"/> Yes <input type="radio"/> Varies		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation					
Justification					
Subgroup considerations					
Implementation considerations					
Monitoring and evaluation					
Research Priorities					

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## Working Group 4: Exercise and Falls

### Recommendations for Working Group 4: Exercise and Falls

**Recommendation 1 (Interventions):** We recommend exercise programmes for fall prevention for community-dwelling older adults that include balance challenging and functional exercises (e.g. sit-to-stand, stepping) should be offered with sessions three times or more weekly which are individualized, progressed in intensity for at least 12 weeks and continued longer for greater effect. **GRADE: 1A**

**Recommendation 2 (Interventions):** We recommend inclusion, when feasible, of Tai Chi and/or additional individualized progressive resistance strength training. **GRADE: 1B**

<i>Population:</i>	Older adults	<i>Objective: Should community-dwelling older adults participate in exercise for falls prevention?</i>		
<i>Intervention:</i>	Exercise, as a stand-alone intervention, as a fall prevention activity			
<i>Comparison:</i>	Usual care			
<i>Main outcomes:</i>	Falls			
<i>Setting:</i>	Community			
<i>Perspective:</i>	Global guidelines: older community-dwellers, clinicians, policy makers			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	Falls in older age is a significant global public health issue as at least one-third of community-dwelling people aged 65 years or above fall each year [1, 2]. Falls also lead to injuries including fractures. The frequency of falls and fall-related injuries increases with age [3, 4]. In the United States, three million older people are treated in emergency departments for falls injuries each year [5], with one in five falls causing a serious injury including hip fracture or a head injury [6]. In Australia, the fall-related injury cases caused 1.2 million days of care over a year, and the cost of falls is predicted to rise to \$1.4 billion by 2051 [7] Falls and fall-related injuries increase morbidity and substantially reduce independence, as well as health-related quality of life [8].	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>● <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			Not formally assessed. It is assumed that most people place a high value on falls and fall-injury prevention.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Exercise (overall)	Critical	⊕⊕⊕⊕ HIGH	
			Balance and functional exercise	Critical	⊕⊕⊕⊕ HIGH	
			Multiple categories of exercise	Critical	⊕⊕⊕○ MODERATE	
			Tai Chi	Important	⊕⊕⊕○ MODERATE	
			Dance	Important	⊕○○○ VERY LOW	
			Resistance exercise	Important	⊕○○○ VERY LOW	
			General physical activity (e.g. walking)	Important	⊕○○○ VERY LOW	
					○○○○ MODERATE	
	What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>● <b>High</b></li> </ul>	<b>Previous evidence showing greater impacts of high dose exercise interventions for falls prevention [9, 10].</b> Previous systematic reviews [9] showed the median intervention duration of interventions that were effective was six months with a total of 52 hours (approximately two hours per week) and that exercise programs that involved 3+ total hours per week and included balance and functional exercises were particularly effective (pooled rate ratio 0.58, 0.45 to 0.76) [10].			

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>• <b>Large</b></li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>				<b>Additional benefits from physical activity</b> Evidence reviews for physical activity guidelines confirm positive outcomes associated with physical activity in the areas of mortality, adiposity, cognition, functional ability, mental health, incidence of health conditions including cancer, cardiovascular disease, type 2 diabetes, osteoporosis [11] well as broader benefits of physical activity, including stress management, improved self-efficacy, sleep and social wellbeing [12].
		<b>Outcome (rate of falls, rate ration)</b>	<b>Nº of patients</b>		<b>Effect</b>	
	<b>Exercise (per 1000-person years)</b>		<b>Control (per 1000-person years)</b>	<b>Relative effect (95% CI)</b>	<b>Difference (95% CI)</b>	
		Exercise (overall)	646 (95% CI 604-706)	850	0.76 (0.71-0.83)	204 fewer per 1000 (from 144 to 244 fewer)
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>• <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Balance and functional exercise	649 (95% CI 587-701)	865	0.75 (0.69-0.81)	216 fewer per 1000 (from 164 to 278 fewer)
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>• <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Multiple categories of exercise	873 (95% CI 696-1097)	1180	0.74 (0.59-0.93)	307 fewer per 1000 (from 83 to 484 fewer)
		Tai Chi	993 (95% CI 787-1251)	1290	0.77 (0.61-0.97)	297 fewer per 1000 (from 39 to 493 fewer)
		Dance	1072 (95% CI 784-1464)	800	1.34 (0.98-1.83)	272 more per 1000 (from 16 fewer to 664 more)
						<b>Risk of physical activity</b> The benefits of regular physical activity generally outweigh the risk of harm from adverse events [12, 13]. Adverse events can happen during any physical activity and include musculoskeletal injuries, cardiac events, heat injuries and infectious disease[13] but adverse events reported in trials are usually non-serious [8] [14]. Activities involving contact or collision with other people have higher injury rates but the risk of serious injury is relatively low with non-contact exercise [13]. Musculoskeletal injuries are usually related to the type of the activity, usual dose or

			Resistance exercise	718 (95% CI 422-1241)	620	1.14 (0.67-1.97)	197 more per 1000 (from 198 less to 621 more)	volume (frequency, duration, and intensity) and rate of progression of the physical activity [13] .
			General physical activity (e.g. walking)	1283 (95% CI 691-2369)	1410	0.91 (0.49-1.68)	127 fewer per 1000 (from 719 fewer to 959 more)	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>			
Resources	<p>What is the certainty of the evidence of resources requirements (costs)?</p> <p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul> <ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> </ul> <p>Varies Trial-based economic analyses of exercise for fall prevention have used different methods and have had variable findings but several have found exercise for fall prevention to be cost-saving or to dominate (to be less costly and more effective) over control [8] [16].</p> <p>An update to the latest review conducted by our group (manuscript in preparation) have identified additional studies and a summary is provided below according to exercise type (results displayed in US 2020 \$):</p> <p>Balance and functional exercise (n=6 trail-based studies): Incremental cost-effectiveness ration (ICER) range from cost-saving (more effective and less costly) to \$3,339/fall</p>	<p>The annual cost of providing exercise programs found to be effective for fall prevention was estimated at between \$500 and \$1200 per person year (2009 AUD, details below) [15]. Our recent review (manuscript in preparation) found that the cost of exercise programs varied from \$0.40 to \$777 per week (2020 US dollars)</p>	<p>The average treatment cost per fall injury treated for older adults was \$3906 in Australia, and the cost ranged between \$369 for non-hospital treatments to \$18454 for hospital admission [18].</p> <p>Overall, more favorable ICERs were found in sub-group analysis conducted for older participants.</p> <p>More work is needed to understand the cost-effectiveness of different fall prevention programs in different populations and settings. Previous studies have used heterogeneous methods making comparison of results difficult. Trial-based analyses have involved relatively short follow-up periods and trials have been</p>	



	<p>prevented; \$9,510/injurious fall prevented; \$130,938/QALY.</p> <p>Multi-component intervention (n=2 trial-based studies): ICER ranging from \$229 to \$897/fall prevented; \$648/injurious fall prevented; \$29,156/QALY gained</p> <p>Tai-Chi (n=3 trial-based studies): ICER ranging from cost-saving to \$3,847/fall prevented; \$38,170/QALY gained. A model-based analysis found an incremental cost-effectiveness ratio of AUD 28,931 per QALY gained from investing in fall prevention programs assuming a program cost of AUD 700 per person and at a fall prevention risk ratio of 0.75 [17]. Two-way sensitivity analysis found that using a threshold of AUD 50,000 per QALY gained programs would remain cost effective at a program cost of AUD 1000 and an effectiveness of 0.73 and that a program cost of \$1500 would be cost effective at a risk ratio of 0.57.</p>	<p>underpowered to detect effects on serious but rare outcomes such as hospitalization and residential care admission. Thus modelled analyses may be more useful to guide funding decisions. The cost health systems are willing to pay per fall prevented are yet to be established.</p> <p>As there are other health benefits associated with ongoing exercise, the other health benefits from exercise should also be considered.</p> <p>Additional information on the costs and return on investment for Otago, Tai Chi and falls management exercise (FaME) relevant to the UK context can be found in a document prepared by Public Health England [19]  <a href="https://www.gov.uk/government/publications/falls-prevention-cost-effective-commissioning">https://www.gov.uk/government/publications/falls-prevention-cost-effective-commissioning</a></p>
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Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>● <b>Varies</b></li> </ul>		Effects on equity are likely to vary. Program implementation could decrease inequities in settings with no-cost or low-cost access to health professionals or to falls prevention exercise programs. In other settings fall prevention exercise programs may only be available to those who can pay for them so inequity could increase.
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>	The acceptability of exercise programs to participants, providers and funders is likely to vary between individuals, programs and settings and is likely to be impacted by cultural values and beliefs [20]. Preference for type and location of exercise is likely to vary between individuals [15]. Barriers to participation in fall prevention exercise are likely to include practical aspects such as transport, access and cost and attitudes such as denial of fall risk and beliefs that no additional prevention measures are necessary [21, 22]. Older people may be motivated to participate in fall-related interventions by a wide range of perceived benefits including interest and enjoyment, improved health, mood and independence [21]. Important factors for promoting adherence may include, physician advice, health professional supervision and the quality of instructors [23].	

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	Most trials of fall prevention interventions have involved implementation in “real-world” settings [8].	It is assumed that the ability of health care systems to fund such programs will vary between countries and jurisdictions, dependent upon funding and staffing. Benefits of exercise are lost when programs are ceased.
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	<p>Recommendation 1: We recommend exercise programmes for fall prevention for community-dwelling older adults that include balance challenging and functional exercises (e.g. sit-to-stand, stepping) should be offered with sessions three times or more weekly which are individualized, progressed in intensity for at least 12 weeks and continued longer for greater effect. GRADE: 1A</p> <p>Recommendation 2: We recommend inclusion, when feasible, of Tai Chi and/or additional individualized progressive resistance strength training. GRADE: 1B</p>				
Justification	<p>The strength of evidence for exercise in preventing falls in older people living in the community is high. This recommendation places a high value on preventing falls in the older population. The strong recommendation also takes into consideration the additional benefits of exercise, the minimal harms and strong cost-effectiveness. The three most convincing forms of exercise are those classified as balance and functional training, Tai Chi, or more than one type of exercise (usually balance and functional exercise plus resistance or aerobic training).</p>				
Subgroup considerations	<p>This recommendation applies to all older people regardless of their assessed risk of falling or age.</p>				
Implementation considerations	<p>Effective programs</p> <ul style="list-style-type: none"> <li>• typically involve challenging exercises undertaken on three days per week for a total time of two hours per week</li> <li>• can be delivered by health/ exercise professionals or trained instructors</li> <li>• can be delivered in a group or taught as an individualised home exercise program</li> </ul> <p>People at higher risk of falling should undertake supervised exercise with trained providers to ensure safety and effectiveness of exercise. Benefits of exercise are lost when programs are ceased. To maximise the uptake of interventions and ongoing adherence to programs, older people should be encouraged to choose their preferred exercise type and setting. When implementing exercise programs for fall prevention, the overall cost and the cost-effectiveness of the programs vary depending on the primary type of exercise chosen, the use of equipment, the location of the program, the person delivering the exercise program and the frequency of follow up on participants’ progression.</p>				

Monitoring and evaluation	Falls and the amount and type of physical activity participation should be monitored through national surveys, clinical audits etc.
Research Priorities	Research gaps include a lack of trials investigating the effect on falls of strength training as a single intervention, walking programmes, recreational activities (e.g. yoga, dance) and sports. There is also insufficient evidence about the impact of exercise on fall-related injuries. There is also a need for studies investigating the effect of commencing participation in exercise in middle age on falls and fall-related injuries in older age. Trials need to be conducted in a range of countries with differing aged care systems and funding models.

### Footnotes for summary of findings table

\*Exercise was classified based on the Prevention of Falls Network Europe (ProFaNE) taxonomy that classifies exercise type as: i) gait, balance, and functional training; ii) strength/ resistance (including power); iii) flexibility; iv) three- dimensional (3D) exercise (e.g. Tai Chi, Qigong, dance); v) general physical activity; vi) endurance; and vii) other kind of exercises. The taxonomy allows for more than one type of exercise to be delivered within a program.

<sup>§</sup> A control intervention is one that is not thought to reduce falls, such as general health education, social visits, very gentle exercise, or 'sham' exercise not expected to impact on falls.

<sup>a</sup>Using Prevention of Falls Network Europe (ProFaNE) taxonomy, gait, balance, and functional training is: gait training = specific correction of walking technique, and changes of pace, level and direction; balance training = transferring bodyweight from one part of the body to another or challenging specific aspects of the balance systems; functional training = functional activities, based on the concept of task specificity. Training is assessment-based, tailored and progressed. Exercise programs included in this analysis contained a single primary exercise category (gait, balance, and functional training); these exercise programs may also include secondary categories of exercise.

<sup>b</sup>Using ProFaNE taxonomy, resistance training is any type of weight training (contraction of muscles against resistance to induce a training effect in the muscular system). Resistance is applied by body weight or external resistance. Training is assessment-based, tailored and progressed. Exercise programs included in this analysis had resistance training as the single primary exercise category; these exercise programs may also include secondary categories of exercise.

<sup>c</sup>Using ProFaNE taxonomy, 3D (Tai Chi) training uses upright posture, specific weight transferences and movements of the head and gaze, during constant movement in a fluid, repetitive, controlled manner through three spatial planes. Exercise programs included in this analysis had 3D (Tai Chi) training as the single primary exercise category; these exercise programs may also include secondary categories of exercise.

<sup>d</sup>Using ProFaNE taxonomy, 3D (dance) training uses dynamic movement qualities, patterns and speeds whilst engaged in constant movement in a fluid, repetitive, controlled manner through three spatial planes. Exercise programs included in this analysis had 3D (dance) training as the single primary exercise category; these exercise programs may also include secondary categories of exercise.

<sup>e</sup>Using ProFaNE taxonomy, physical activity is any movement of the body, produced by skeletal muscle, that causes energy expenditure to be substantially increased. Recommendations regarding intensity, frequency and duration are required in order to increase performance. Exercise programs included in this analysis had general physical activity (including walking) training as the single primary exercise category; these exercise programs may also include secondary categories of exercise.

<sup>f</sup>Using ProFaNE taxonomy, exercise programs included in this analysis had more than one primary exercise category. We categorised exercise based on the Prevention of Falls Network Europe (ProFaNE) taxonomy that classifies exercise type as: i) gait, balance, and functional (task) training; ii) strength/ resistance (including power); iii) flexibility; iv) three-dimensional (3D) exercise (e.g. Tai Chi, Qigong, dance); v) general physical activity; vi) endurance; and vii) other kind of exercises. The programs of ten included, as the primary intervention, gait, balance, and functional (task) training plus resistance training. The exercise programs may also include secondary categories of exercise.

**Further program cost information [15]**

<i>Annual cost</i>	<i>Cost per person 2009 AUD</i>		
<b>One-year home-based exercise program delivered by district nurse (with the involvement of physiotherapists in exercise intervention) [15]</b>			
Training cost	\$49.88		
Recruitment, program and prescription and follow up	\$886.28		
Program quality control supervision	\$154.36		
<b>TOTAL</b>	<b>\$1090.52</b>		
<b>One-year home-based exercise program delivered by general practice-based nurse (with the involvement of physiotherapists in exercise intervention) [15]</b>			
Training cost	\$22.07		
Recruitment, program and prescription and follow up	\$1016.15		
Program quality control supervision	\$194.67		
<b>TOTAL</b>	<b>\$1232.89</b>		
<b>15-week Tai Chi group program[15]</b>			
Recruitment and coordination cost	\$102.30		
Training cost that includes cost of instructor, venue hire, music license fees per class	\$367.50		
<b>TOTAL</b>	<b>\$469.80</b>		
<i>Cost per person 2018 £</i>			
Cost of three exercise interventions in the United Kingdom	Otago program [19]	FaME [19]	Tai Chi [19]
Staff time	£345.40	£121.53	£238.20
Staff training	£1.72	£4.23	£3.58
Equipment/Facilities	£23.18	£47.19	£78.52
Transport	£50.00	£37.51	£36.76
Evaluation cost	£21.01	£10.52	£17.85
<b>TOTAL</b>	<b>£441.31</b>	<b>£220.98</b>	<b>£374.91</b>

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## Recommendations for Working Group 4: Exercise and Falls

### Recommendation 3: We recommend individualized supervised exercise as a falls prevention strategy for adults living in long-term care settings. GRADE: 1B

<b>Population:</b>	Older people	<b>Objective:</b> Should exercise versus usual care be used to reduce falls in older people living in residential care?
<b>Intervention:</b>	Exercise (as a stand-alone intervention) as a falls prevention activity (trials recording falls as aEs excluded; whole body vibration alone excluded)	
<b>Comparison:</b>	Usual Care	
<b>Main outcomes:</b>	Falls	
<b>Setting:</b>	Residential aged care	
<b>Perspective:</b>	International guidelines: residents, clinicians, aged care managers and policy makers	

Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	Estimates of the proportion of older people living in residential aged care varies between countries, partly due to differences in definition and measurement, but is likely to range between 6 and 16 percent of those aged 80 and over [1, 2]. Falls in residential aged care have are common and cause significant morbidity and mortality, due to fall-related injuries and fractures, including hip fracture. Falls incidence varies but a “middle of the road” figure is 1.7 falls per person-year compared with 0.65 falls per person year in the community. Falls can be as high as 2.5 falls per person-year [3]. With the ageing of the population, the public health impact and prevalence of this problem is increasing.	



Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>● <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			Not formally assessed. It is assumed that most people place a high value on falls and fall-injury prevention.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Rate of falls	Critical	⊕⊕⊕○ MODERATE	Based on a <b>range of benefits of exercise</b> , the World Health Organisation guidelines recommend that all older adults should undertake regular physical activity and that older adults should be as physically active as their functional ability allows, and adjust their level of effort for physical activity relative to their level of fitness (WHO physical activity guidelines) <sup>[4]</sup> .  Effective multifactorial strategies in aged care (Becker 2003 <sup>[5]</sup> ; Dyer 2004 <sup>[6]</sup> ) have included exercise with individualised combination exercise interventions plus environmental modifications and staff training (Cameron 2018) <sup>[3]</sup> .
			Risk of Fracture	Critical	⊕⊕○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>• <b>Large</b></li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>				<p>Whilst there is some uncertainty about the effectiveness of exercise when all trials in aged care are pooled; examining the rate of falls as measured at the end of the intervention period demonstrates that exercise significantly reduces falls.</p>	
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>• <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b> <b>N<sub>o</sub> of participants (studies)</b>	<b>Anticipated absolute effect on falls (95% CI)</b>				<b>Effect</b>
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>• <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		<b>Usual Care</b>	<b>Exercise</b>	<b>Difference</b>		<b>Relative effect (95% CI)</b>
Rate of falls N <sub>o</sub> of participants: 1701 (13 studies)	2300/1000-person years	1,587/1000py (1,150-2,208/1000py)	713/1000py fewer (1150 fewer to 92 more)	RR: 0.69 (0.50-0.96)	<p><b>Adverse events:</b>            In Cameron 2018 <sup>[3]</sup>, 9/16 trials reported on adverse events, there was 1 serious adverse event reported/1032 participants (very low evidence).<sup>1</sup> No serious adverse events were reported in the additional 4 trials (642 participants) reporting adverse events contributing data in the update.</p>		
Number of people sustaining a fracture-all fractures N <sub>o</sub> of participants: 407 (2 studies)	42/1000 people (4.2%)	37/1000 people (14-92/1000)	5 fewer per 1000 (28 fewer to 50 more)	RR: 0.87 (0.34-2.20)			
Number of people sustaining a fracture – hip fractures N <sub>o</sub> of participants: 186 (1 studies)	23/1000 persons/year (2.3%)	12/1000 people (1-120/1000)	11 fewer per 1000 (22 fewer to 97 more)	RR: 0.50 (0.05-5.20)			

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>	<p>Adverse Events: 1 serious adverse event reported (death due to a ruptured abdominal aortic aneurysm one week after the follow-up tests, association could not definitely be ruled out) in 1 trial (183 participants)</p> <p>Three trials reported no differences in adverse events:</p> <ul style="list-style-type: none"> <li>● 1 trial (639 participants) reporting aches and pains, P=0.75</li> <li>● 1 trial (194 participants) reported no statistical difference in severe soreness (10 exercise versus 11 control), severe bruises (2 versus 1), severe fatigue (4 versus 1)</li> <li>● 1 trial reported no adverse events</li> </ul>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>	<p>Most trials do not report resource use or costs. Cameron 20181 reported 2 older studies that included exercise interventions and evaluated costs of interventions.</p> <ul style="list-style-type: none"> <li>● Buettner (2002) reported lower healthcare service costs for an intervention group receiving daily walking plus a 3x weekly exercise for function program and a sensory air mat 2x weekly in comparison to usual care (\$30, 031 USD vs \$79, 535 USD). This study stated that falls were reduced but the effect estimate was not reported [7].</li> <li>● Mulrow (1994) reported an average intervention cost of \$USD 1,220 (95%CI \$412 to \$1832) vs \$189 (95%CI \$80 to \$298) for a 1:1 physical therapy program 3x weekly over 4 months vs. friendly visits control per person. The intervention in this study did not reduce falls, healthcare costs were \$USD 11,398 (95% CI \$10,929 to \$11,849) (control costs NR, not significantly different).</li> </ul> <p>More recently, Hewitt (2019) [8] reported costs of an effective combination exercise program with individually prescribed progressive resistance training plus balance exercise in a group setting delivered over 6 months as \$AUD 463 per participant. The costs included the initial purchase of gymnasium equipment (\$AU 60,000) and servicing (\$264 per participant). However, the equipment was transported and shared between facilities which is likely to underestimate the true cost to a single facility implementing the program. In addition, the analysed costs include a single staff activities officer however 2 activities officers and physiotherapist attendance once per</p>	<p>Intervention costs for an effective intervention are not clearly reported. The intervention costs per person are likely to be relatively small compared to the cost of residential care and may save healthcare costs overall. The implementation cost at a national level may be significant due to a potentially large eligible population.</p>

			fortnight are recommended for program delivery. Two small effective trials have used less resource intensive interventions: Jahanpeyma (2021) [9] tested the Otago program which utilises ankle weights and Irez (2011) [10] intervention used resistance bands, mats and exercise balls.	
	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<p>Most trials do not report cost-effectiveness analysis.</p> <p>The effective combination exercise program with individually prescribed progressive resistance training plus balance exercise in a group setting delivered over 6 months in Hewitt (2019) was cost-effective with a (bootstrapped) cost-effectiveness ratio of \$18 per fall per person avoided (95% CI -\$380.34 to \$417.85) [8]. This analysis included costs of equipment purchasing shared between participants, which is likely to be more favourable than the experience of a single aged care facility implementing the program.</p> <p>Scenario analysis indicated that the exercise program was dominant (ie both more effective and less costly), with a cost saving of \$333 per fall avoided in subsequent years, however this analysis did not capture the upfront equipment costs and assumed that the gym equipment had already been purchased and the programme implemented.</p>	<p>True implementation costs in Hewitt (2018) may be underestimated.</p> <p>No cost-effectiveness analysis was conducted for Jahanpeyma (2021) <sup>[9]</sup> or Irez (2011) <sup>[10]</sup>; these programs may be less costly but evidence for effectiveness is highly limited.</p>

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>● <b>Varies</b></li> </ul>		It is assumed that effects on equity are likely to vary. In systems where access is possible through public funding it may decrease inequities by improving falls outcomes in residents that have not previously had appropriate access to effective interventions. In jurisdictions where public funding to deliver the intervention cannot be accessed, and funding is required, implementation may be greater in facilities with higher levels of private funding/staffing and inequities may increase.
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>	The intervention arm of Hewitt (2018) recruited 26% (113/439) of eligible participants <sup>[11]</sup> . Whilst recruitment to trials may differ from participation in a program, this is likely to indicate a lack of universal acceptability. Attendance in this trial ranged from 81% to 56% of sessions in the first 25 weeks of individually prescribed exercise supervised by a physiotherapist but during the “maintenance phase” which was supervised by facility staff or volunteers was 51% to 31% of sessions.	It is assumed that the acceptability of an exercise program will vary between different residents, programs and settings.

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>		It is assumed that the ability of aged care providers to fund such programs will vary between countries and jurisdictions, dependent upon aged care funding systems and staffing.
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ●	Strong recommendation for the intervention ○
Recommendation	Recommendation 3: We recommend individualized supervised exercise as a falls prevention strategy for adults living in long-term care settings. GRADE: 1B				
Justification	<p>The strength of evidence for exercise alone in preventing falls in older people living in residential care when measured at the end of the intervention period is moderate. This recommendation places a relatively high value on preventing falls in this population. This evidence plus additional benefits of exercise (see World Health Organisation guidelines <sup>[4]</sup> and evidence from exercise as a component of effective multifactorial strategies in aged care (Cameron 2018) <sup>[3]</sup>), minimal harms and likely cost-effectiveness contribute to the justification for a conditional positive recommendation.</p> <p>In terms of individual trials, the most convincing evidence for exercise for falls prevention in this population comes from Hewitt (2018) <sup>[12]</sup>, thus the exercise program in this trial plus a sensitivity analysis excluding a single trial with a poor exercise intervention, a subgroup analysis by exercise type and the effective multifactorial trials in Cameron (2018) <sup>[3]</sup> inform the practice points.</p>				
Subgroup considerations	None, due to a lack of evidence. Whilst a subgroup analysis on type of exercise shows significant subgroup differences, this did not provide clearer guidance on the conditions needed for effective exercise interventions in aged care due to minimal numbers of trials in some subgroups and remaining high heterogeneity in others. Additional well conducted and clearly reported trials are required to further inform these considerations				
Implementation considerations	<p>The cost-effectiveness of any program is strongly influenced by the effectiveness of the program. Whilst Hewitt (2018) was an effective program, the equipment purchase cost was \$AUD 60,000 (2015 costs) and the most effective initial 25-week phase included supervision by a physiotherapist. The cost-effectiveness analysis included a single activities officer although it is recommended implementing the program with a physiotherapist attendance once per fortnight and two trained activities officers for all other sessions<sup>[8]</sup>. Feasibility accounting for costs of staffing and equipment and staff availability need to be considered. Individual preferences of residents are likely to play a role in acceptability.</p> <p>Two other smaller trials (Irez (2011) <sup>[10]</sup> and Jahanpeyma (2021) <sup>[9]</sup> tested interventions that are likely to be less resource intensive (utilising resistance bands, mats and exercise balls <sup>[10]</sup> and ankle weights <sup>[9]</sup>) and may be less costly, although the evidence for the effectiveness of these interventions is highly limited and the cost-effectiveness has not been examined.</p>				

Monitoring and evaluation	Falls rates in aged care facilities are highly variable. Falls and fall-related injuries should be continuously monitored and evaluated over time with appropriate statistical techniques. The amount and type of physical activity undertaken should also be monitored.
Research Priorities	The certainty of the evidence supporting the benefits of exercise in older people living in residential care is moderate but there remains a lack of trials to inform the type of exercise program that is most beneficial. Additional trials of a sample size powered to detect a reduction in falls, reporting all appropriate falls outcomes (rate of falls, risk of falls and injurious falls), with cost-effectiveness analyses and clearly describing the intervention and comparison components, setting and characteristics, enrolled participants (e.g. proportion of participants with cognitive impairment and its severity) and qualifications of the person delivering the exercise intervention are required. Trials need to be conducted in a range of countries with differing aged care systems and funding models.

### References

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## Recommendations for Working Group 4: Exercise and Falls

**Recommendation 4: We recommend that adults with Parkinson’s Disease at an early to mid-stage and with mild or no cognitive impairment are offered individualized exercise programmes including balance and resistant training exercise. GRADE: 1A**

<b>Population:</b>	People with Parkinson’s Disease	<b>Objective:</b> <i>Should exercise versus no exercise be used to reduce falls in people with Parkinson’s disease?</i>		
<b>Intervention:</b>	Exercise (as a stand-alone intervention) designed as a falls prevention activity (ie, trials recording falls as adverse events excluded)	<b>Background:</b> Parkinson’s disease (PD) is a common neurodegenerative disorder. It is estimated that over 10 million people worldwide have PD, and this number is projected to grow exponentially over the next 20 years [1]. People with PD fall twice as often as people in the general older population, with some individuals falling multiple times per day [2]. These falls are costly to individuals and the healthcare system.		
<b>Comparison:</b>	Usual care or a non-active intervention			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	All			
<b>Perspective:</b>	International guidelines, community, residents, clinicians and policy makers			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	<p>Around 60% of people with PD fall each year, and around 66% of these fall recurrently [2]. This is twice the rate of falls in the general older population [3]. Consequently, people with PD have an increased rate of injury, including a rate of hip fracture that is two [4] to four times greater [5] than people of the same age without PD. Falls are costly to the individual and the healthcare system and are a leading cause of reduced quality of life for the person with PD [6], caregiver burden [7]. and institutionalisation [8]. With the number of people with PD increasing rapidly [1], the public health impact of this problem is increasing.</p>	<p>Falls are costly to the individual and the healthcare system [9, 10]. Falls are associated with reduced quality of life [6], care giver burden [7] and nursing home admission [8]. There is evidence that many people with PD are fearful of falling and modify their activities to try to reduce their risk of falling [11].</p>



<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>● <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			<p>Not formally assessed. It is assumed that most people with PD place a high value on falls and fall-injury prevention.</p> <p>A 25% reduction in fall rates in people with PD has been reported to be the minimum clinically important difference from a Delphi study [16].</p> <p>While there is little evidence about the efficacy of exercise for people with more advanced disease, there is some evidence that it may be beneficial in improving mobility and balance [17].</p> <p>Based on a range of benefits of exercise, the World Health Organisation guidelines recommend that all older adults should undertake regular physical activity and that older adults should be as physically active as their functional ability allows, and adjust their level of effort for physical activity relative to their level of fitness (WHO physical activity guidelines) [18].</p>
	What is the overall certainty of this evidence?	<p>Mild to moderate PD with good cognition</p> <ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>● <b>High</b></li> </ul> <p>Advanced PD</p> <ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul> <p>There is very low certainty evidence that exercise increases falls compared to control in people with more advanced disease, but there are no studies in people with impaired cognition (MMSE &lt; 24).</p>	Outcome	Relative Importance	Certainty of the evidence (GRADE)	
			Rate of falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
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<p>How substantial are the desirable anticipated effects of the intervention?</p>	<p>Mild to moderate PD with good cognition</p> <ul style="list-style-type: none"> <li>• <b>Large</b> <ul style="list-style-type: none"> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul> </li> </ul> <p>Advanced PD</p> <ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>• <b>Don't know</b></li> </ul>	<p><b>Summary of findings (GRADE):</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Outcome</th> <th colspan="2">№ of patients</th> <th>Effect</th> </tr> <tr> <th>Intervention</th> <th>Control</th> <th>Relative / Absolute (95% CI)</th> </tr> </thead> <tbody> <tr> <td>Rate of falls (falls per person-year) Follow-up: range 2 weeks to 12 months</td> <td>6105 falls per 1000 people (5198-7178)</td> <td>8250 falls per 1000 people</td> <td>RR: 0.74 (0.63-0.87)</td> </tr> </tbody> </table>	Outcome	№ of patients		Effect	Intervention	Control	Relative / Absolute (95% CI)	Rate of falls (falls per person-year) Follow-up: range 2 weeks to 12 months	6105 falls per 1000 people (5198-7178)	8250 falls per 1000 people	RR: 0.74 (0.63-0.87)	<p>Evidence is from a Cochrane review currently under peer review [12, 13]. The overall certainty of the evidence was downgraded to moderate as most participants had mild to moderate disease and good cognition – ie, those with advanced disease and/or cognitive impairment were excluded. Therefore the evidence for people with mild to moderate disease and good cognition is high certainty.</p>
Outcome	№ of patients			Effect										
	Intervention	Control	Relative / Absolute (95% CI)											
Rate of falls (falls per person-year) Follow-up: range 2 weeks to 12 months	6105 falls per 1000 people (5198-7178)	8250 falls per 1000 people	RR: 0.74 (0.63-0.87)											
<p>How substantial are the undesirable anticipated effects of the intervention?</p>	<p>Mild to moderate PD with good cognition</p> <ul style="list-style-type: none"> <li>○ Trivial</li> <li>• <b>Small</b> <ul style="list-style-type: none"> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul> </li> </ul> <p>Advanced PD</p> <ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>• <b>Large</b> <ul style="list-style-type: none"> <li>○ Varies</li> <li>○ Don't know</li> </ul> </li> </ul>	<p>Comments: Overall, exercise probably reduces the number of falls by 26% (95% CI 37% reduction to 13% reduction).</p> <p>Guide to the data: In the population of people with Parkinson's disease involved in exercise trials, if 1000 people with Parkinson's disease were followed over 1 year, the number of falls in the overall population would be 8250, compared to 6105 (95% CI 5198-7178) in people receiving exercise intervention.</p> <p><b>Overall analysis-- Mild to moderate disease and good cognition:</b> There is <u>high certainty</u> evidence, therefore that <u>exercise reduces falls</u> in people with mild to moderate disease and good cognition by 26% (37% reduction to 13% as per the table above). The rate ratio overall is 0.74 (0.63 to 0.87).</p> <p><b>Subgroup analysis</b> <b>100% supervision:</b> There is <u>low certainty</u> evidence, that exercise that is fully supervised may reduce falls by 44% (59% reduction to 33% reduction). The rate ratio is 0.56 (0.41 to 0.77) <b>&lt;100% supervision:</b> There is <u>moderate certainty</u> evidence that exercise</p>												
<p>Does the balance between desirable effects and undesirable effects favour the option of the comparison?</p>	<p>Mild to moderate PD with good cognition</p> <ul style="list-style-type: none"> <li>• <b>Favours the option</b> <ul style="list-style-type: none"> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the</li> </ul> </li> </ul>	<p><b>Subgroup analysis</b> <b>100% supervision:</b> There is <u>low certainty</u> evidence, that exercise that is fully supervised may reduce falls by 44% (59% reduction to 33% reduction). The rate ratio is 0.56 (0.41 to 0.77) <b>&lt;100% supervision:</b> There is <u>moderate certainty</u> evidence that exercise</p>												

	<p>comparison</p> <ul style="list-style-type: none"> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul> <p>Advanced PD</p> <ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>● <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<p>that is partially supervised probably reduces the rate of falls by 15% (25% reduction to 3% reduction). The rate ratio is 0.85 (0.75 to 0.97).</p> <p><b>Pooled subgroup data</b></p> <p><b>More advanced disease:</b> Two studies performed subgroup analyses according to disease severity. When the subgroup data for participants with more advanced disease ([14], MDS-UPDRS equivalent motor score of <math>\geq 34</math>; [15], MDS-UPDRS motor score <math>\geq 39</math>) is pooled, there is <u>very low certainty evidence</u>, therefore we are unsure of the effect of exercise on the rate of falls in people with moderately advanced disease. The rate ratio for this subgroup was 1.47 (1.11 to 1.94) – ie, a 47% <u>increase</u> in the rate of falls (11% increase to 94% increase). Notably, the exercise programs in these trials were minimally supervised. There are no studies with participants with substantially impaired cognition (MMSE &lt; 24).</p> <p><b>Adverse Events</b></p> <p>The unpublished Cochrane review found that adverse events were not reported consistently, however when they were reported, they were overall minor and transient in nature (eg muscle soreness, musculoskeletal injury) [12].</p>	
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Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> <li>● <b>Varies</b></li> </ul>	[19-23]	Studies with less supervision have lower costs, however the subgroup analysis shows that full supervision may be more effective than less supervision. The implementation cost at a national level may be significant.
	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>● <b>Varies</b></li> </ul>	The most cost-effective programs [14, 25, 26] have involved twice weekly group-based Tai-Chi delivered by an instructor [26] or balance and strengthening exercises [14, 25] delivered in a group setting by a physiotherapist (weekly for [25], monthly for [14]) with additional twice [25] to thrice [14] weekly home-based sessions.	Very little data but appears that exercise may be cost effective in terms of cost per fall prevented in people with mild to moderate disease severity and good cognition. Negative ICERs indicate that the intervention is dominant, i.e., more effective, and less costly.

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>● <b>Varies</b></li> </ul>	No research found	<p>Effects on equity are likely to vary. In systems where access is possible through public funding it may decrease inequities by improving access to intervention in people with PD that have not previously had appropriate access to effective interventions. In jurisdictions where public funding to deliver the intervention cannot be accessed, and funding is required, intervention may only be accessed by individuals who are able to pay, so inequities may increase.</p> <p>In research studies, exercise has typically been delivered and/or prescribed and/ by a health professional with expertise in PD, mostly physiotherapists. While ideal, such trained health professionals may not always be available in every jurisdiction.</p>
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<p style="text-align: center;"><b>Acceptability</b></p>	<p>Is the option acceptable to key stakeholders?</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>	<p>The option is acceptable to people with PD. Retention rates in exercise trials is generally high (&gt;85%) and there is good adherence to exercise interventions in people with PD (generally &gt;80%) [28].</p>	<p>The acceptability of an exercise program is likely to vary between individuals with PD.</p>
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Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input checked="" type="radio"/> <b>Varies</b></li> </ul>	Research has shown exercise interventions for people with PD are feasible.	The ability of health care systems to fund such programs will vary between countries and jurisdictions, dependent upon funding and staffing. Cost constraints may be barriers to providing widely available exercise by trained therapists.
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	<p>Recommendation 3: We recommend individualized supervised exercise as a falls prevention strategy for adults living in long-term care settings. GRADE: 1B</p> <p>Recommendation 4: We recommend that people with Parkinson’s Disease at an early to mid-stage and with mild or no cognitive impairment are offered individualized exercise programmes including balance and resistant training exercise. GRADE: 1A</p>				
Justification	<p>Justification (recommendation 1) Given the high frequency of falls amongst people with PD, the effectiveness of exercise in reducing falls in people with mild to moderate disease, and the minor and transient effects of most exercise-related adverse events, we concluded that most people with mild to moderate PD would choose to undertake a falls prevention exercise program.</p> <p>Justification (recommendation 2) Increasing the level of supervision may improve the effectiveness of the exercise. People with PD have complex impairments, therefore a trained health or fitness professional should be involved in the prescription and monitoring of the exercise if possible.</p> <p>Justification (recommendation 3) There is a lack of research regarding the effect of exercise on falls in people with advanced disease and/or impaired cognition. However, there is very low certainty evidence that minimally supervised exercise may substantially increase the rate of falls in people with more advanced disease.</p> <p><b>Detailed justification</b> <u>Balance of effects</u> Although information about adverse events associated with exercise in people with PD is inconsistently reported, the balance of desirable and undesirable effects favours exercise. Exercise reduces fall rates by 26% in people with mild to moderate disease and good cognition. This equates to 2,145 fewer falls per year per 1,000 people with PD who undertake an exercise program. Adverse events from exercise interventions appear to be infrequent, minor and transient in nature (eg muscle soreness and musculoskeletal injuries). We therefore conclude that the net benefit for these people</p>				

	<p>with PD is high.</p> <p>Fully supervised exercise may have a greater effect on reducing falls, however there is no evidence regarding the effect of supervision on the number or nature of adverse events. There is a subgroup difference between fully supervised and less than fully supervised exercise, where fully supervised exercise may reduce fall rates by 44% (equivalent to 3,630 fewer falls per year per 1,000 people with PD who undertake an exercise program) and less than fully supervised exercise probably reduces fall rates by 15% (equivalent to 1,238 fewer falls per year per 1,000 people with PD who undertake an exercise program). We consider it unlikely that increased supervision would increase adverse events, and therefore the balance of effects favours increased supervision.</p> <p>The balance of effects is less clear for people with advanced disease. There is little information to guide recommendations for this group, and we are unsure if exercise has an adverse effect of increasing the rate of falls in this group. There are no studies including participants with PD and impaired cognition (MMSE &lt; 24).</p> <p><u>Quality of evidence</u></p> <p>While the level of certainty that exercise reduces falls in people with PD overall is moderate, there is a high level of certainty that it reduces falls in people with mild to moderate disease and good cognition. Fully supervised exercise may lead to a greater reduction in fall rates (low certainty evidence).</p> <p>We are unsure if exercise increases fall rates in people with more advanced disease due to minimal evidence that is of very low certainty for this group.</p> <p><u>Values and preferences</u></p> <p>The alternative management strategy is for no exercise. The acceptability of an exercise program is likely to vary between individuals with PD. However, research trials have high overall retention and adherence rates. Additionally, most people with PD fear falling and are willing to undertake activities designed to reduce their risk of falling. This suggests that many people with PD would prefer to undertake exercise if it would reduce their rate of falling.</p> <p><u>Costs</u></p> <p>There is little information about the cost effectiveness of exercise for fall prevention in people with PD, however there is some evidence that it may be cost-effective in people with mild to moderate disease and no cognitive impairment. Additionally, the cost of this intervention is relatively small to moderate, depending on the level of supervision provided.</p>
Subgroup considerations	Recommendations are made on the basis of subgroup analyses.
Implementation considerations	<p>A training program will be required for therapists/exercise providers to ensure they have the expertise in exercise prescription for people with PD.</p> <p>Systems will be required to make affordable exercise options widely available to people with PD.</p> <p>Providing fully supervised exercise may not be acceptable to health care services due to the cost and resource requirements.</p>



	<p>Effectiveness of the exercise intervention will drive the cost-effectiveness of the program.</p> <p>In people with mild to moderate disease, programs that include an exercise class taught by a health professional supplemented with home-based training (eg.[13]) are likely to be more cost effective.</p>
Monitoring and evaluation	<p>Falls and fall-related injuries should be continuously monitored and evaluated over time with appropriate statistical techniques. The amount and type of physical activity undertaken should also be monitored.</p>
Research Priorities	<p>The type, dose and location of exercise that is best to reduce falls</p> <p>The level of supervision required to be optimally effective</p> <p>Effect of exercise interventions on fall rates in people with advanced disease and/or cognitive impairment</p> <p>Cost effectiveness of fall prevention exercise</p> <p>Strategies to implement exercise into the routine care of people with PD</p> <p>Effect of exercise on adverse events</p> <p>The effect of multifactorial and multiple component interventions, including exercise, on fall rates across the PD disease spectrum.</p> <p>Trials need to be conducted in a range of countries with differing health care and community support systems and funding models.</p>

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## **Recommendations for Working Group 4: Exercise and Falls**

**Recommendation 5: We conditionally recommend that older adults after a stroke should be offered participation in individualized exercise programmes aimed at improving balance/strength/walking to prevent falls. GRADE:2C**

<b>Population:</b>	People with stroke	<b>Objective:</b> Should exercise versus no exercise be used to reduce falls in people with Stroke?		
<b>Intervention:</b>	Exercise aimed at improving strength/balance/walking			
<b>Comparison:</b>	No exercise or exercise not challenging to balance			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	All			
<b>Perspective:</b>	International guidelines: people with stroke, health professionals, policy makers			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	Between 50 and 73% of people with stroke will fall in a given year [1, 2], which is twice the likelihood of falls in the general older population [3]. People with stroke also have higher rates of injury, particularly fractured neck of femur, with a rate 2 times higher than in the general population [4]. Falls are costly to the individual and the healthcare system [5] and have a negative impact on quality of life, concerns about falling and participation [6, 7]. Despite recent advances in treatment of acute stroke, the world-wide incidence and prevalence of stroke is increasing [8, 9]. Therefore the public health impact of falls in people with stroke is also increasing.	Falls are costly to the individual and the healthcare system [5]. Falls are associated with reduced quality of life, concerns about falling[6, 7], care giver burden [10] and nursing home admission [11]. There is evidence that many people with stroke are fearful of falling and modify their activities to try to reduce their risk of falling [12].

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>● <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			<p>Not formally assessed. It is assumed that most people with stroke place a high value on falls and fall-injury prevention.</p> <p>Based on a range of benefits of exercise, the World Health Organization guidelines recommend that all older adults should undertake regular physical activity and that older adults should be as physically active as their functional ability allows, and adjust their level of effort for physical activity relative to their level of fitness [18]. For people with stroke, exercise may be beneficial for other aspects including reducing disability, improving cardiovascular fitness, mood and targeting risk factors for further stroke [19-22]</p>
	What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>	<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Rate of falls	Critical	⊕⊕○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	

<p>How substantial are the desirable anticipated effects of the intervention?</p>	<ul style="list-style-type: none"> <li>• <b>Large</b></li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p><i>Summary of findings (GRADE):</i></p>					
<p>How substantial are the undesirable anticipated effects of the intervention?</p>	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>• <b>Small</b></li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p><b>Outcome</b></p>	<p><b>Intervention</b></p>		<p><b>Effect</b></p>		
<p>Does the balance between desirable effects and undesirable effects favour the option of the comparison?</p>	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>• <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<p>Rate of falls No of participants:638 (6 studies, 8 comparisons)</p>	<p>1780 per 1000 person-years</p>	<p>979 per 1000 person-years (694-1388)</p>	<p>801 fewer per 1000 (from 1085 fewer to 373 fewer)</p>	<p>RR: 0.55 (0.39-0.78)</p>	
<p>The evidence sources are the most recent Cochrane Review [13] and search of literature since the last search date stated in the Cochrane Review.</p>		<p>The most recent Cochrane Review [13] concluded that for preventing falls in people after stroke, exercise may reduce the rate of falls compared to control, but that there is uncertainty about the result. The pooled result was a rate ratio of 0.72, 95%CI 0.45 to 0.94 including 764 participants, rated as low quality evidence according to the GRADE criteria. However, this review included some studies in which the control condition consisted of exercises that also target balance, strength and gait performance. While this is a valid approach in terms of evidence review, for the purpose of guidelines, the clinical question is whether exercise targeted at balance, strength or gait should be prescribed compared to no exercise or exercise that does not challenge balance e.g. upper limb. On this basis 2 studies were excluded: Dean 2010 [14], and Mansfield 2018 [15]. An additional study (Lau 2014 [16]) was excluded because the control condition included exercise that was the same as the intervention (but without full body vibration). One additional study that was published since the Cochrane review was also included [17]</p>					
<p>The overall certainty of the evidence was downgraded to low due to inconsistency and imprecision</p>							

		<p><b>Overall analysis Stroke (not including acute stroke):</b> There is <u>low</u> certainty evidence, that <u>strength, balance, and gait exercise</u> decreases falls compared to no exercise or exercise that doesn't challenge balance. The level of certainty in this evidence review is the same as the Cochrane Review [13].</p> <p>There were insufficient studies to undertake any sub-group analysis.</p>	
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> <li>● <b>Varies</b></li> </ul>	<p>The included trials did not report costs of implementing the intervention. Collins (2018) [23] examined the costs and effectiveness of providing supervised exercise classes to people with stroke, which is broadly equivalent to the resources that might be required to deliver falls prevention exercise classes for people with stroke. The resource requirements are likely to vary with the type of exercise delivered and degree of supervision.</p>	<p>Intervention costs for an effective intervention have not been reported in the included studies. Resource requirements are likely to vary with amount of supervision provided and need for equipment. The intervention costs per individual are likely to be small relative to costs associated with injury, decreased quality of life and need for health care. The overall costs to implement exercise to a national population is likely to be high considering the total number of people with stroke.</p>
	<p>Does the cost effectiveness favour the intervention or the comparison?</p> <ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> </ul> <p><b>Varies</b> The included trials did not report cost-effectiveness. Collins 2018 [23] reported that supervised exercise classes were cost-effective in improving physical fitness after stroke, but did not consider falls outcomes.</p>	<p>The cost-effectiveness for exercise in preventing falls in people with stroke is unknown.</p>		



Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>● <b>Varies</b></li> </ul>	No research found	<p>It is assumed that effects on equity are likely to vary. In systems where access is possible through public funding it may decrease inequities by improving access to intervention in people with stroke that have not previously had appropriate access to effective interventions. In jurisdictions where public funding to deliver the intervention cannot be accessed, and funding is required, intervention may only be accessed by individuals who are able to pay, so inequities may increase.</p> <p>In research studies, exercise has typically been delivered and/or prescribed and/ by a health professional with expertise in stroke, mostly physiotherapists. Physical fitness training, ideally led by trained professionals is beneficial for people after stroke [22]. While ideal, such trained health professionals may not always be available in every jurisdiction.</p>
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<p style="text-align: center;">Acceptability</p>	<p>Is the option acceptable to key stakeholders?</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>	<p>Adherence to exercise after stroke is variable.</p>	<p>It is assumed that the acceptability of an exercise program is likely to vary between individuals with stroke and according to exercise type. There is currently a lack of research about how individual factors influence adherence.</p>
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Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>	Research has shown exercise interventions for people with stroke are feasible.	It is assumed that the ability of health care systems to fund such programs will vary between countries and jurisdictions, dependent upon funding and staffing. Cost constraints may be barriers to providing widely available exercise by trained therapists.
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ●	Strong recommendation for the intervention ○
Recommendation	Recommendation 5: We conditionally recommend that older adults after a stroke should be offered participation in individualized exercise programmes aimed at improving balance/strength/walking to prevent falls. GRADE:2C				
Justification	The above recommendation is based on the point estimate and other systematic review evidence of health benefits of exercise aimed at improving strength/balance/walking in this clinical group [18] .				
Subgroup considerations	Subgroups were not considered due to small number of studies.				
Implementation considerations	The optimal dosage and level of supervision of exercise for falls prevention in people after stroke is not known due to lack of evidence.				
Monitoring and evaluation	Falls and fall-related injuries should be continuously monitored and evaluated over time with appropriate statistical techniques. The amount and type of physical activity undertaken should also be monitored.				
Research Priorities	Overall, the number of studies and the certainty of evidence supporting the benefits of exercise for falls prevention in people with stroke is low. Additional research is needed with appropriate sample sizes to examine the effects of exercise compared to no exercise on all falls outcomes including injury. Health economic evaluation also needs to be incorporated into the design and reporting of trials. Additionally, more research is required to examine the effects of research on falls in for different levels of stroke severity and in different stages of acuity. Trials need to be conducted in a range of countries with differing health care and community support systems and funding models.				

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## Recommendations for Working Group 4: Exercise and Falls

**Recommendation 6: We recommend that older adults after sustaining a hip fracture should be offered an individualized and progressive exercise programme aimed at improving mobility (i.e. standing up, balance, walking, climbing stairs) as a fall prevention strategy. GRADE: 1B**

**Recommendation 7: We conditionally recommend that such programmes for older adults after a hip fracture are best commenced in hospitals and continued in the community. GRADE: 2C (In-patients) & 1A (Community)**

<b>Population:</b>	Older adults	<i>Objective: Should mobility interventions versus no additional mobility interventions be used in adults after hip fracture?</i>		
<b>Intervention:</b>	Exercise to improve mobility after hip fracture surgery, (trials recording falls outcomes)			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	In hospital or community			
<b>Perspective:</b>	International guidelines: clinicians, aged care managers and policy makers			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	The global call to action to improve the care of people with fragility fractures identified the need to urgently improve acute and post-acute care following fragility fracture, plus secondary prevention to prevent further fractures [1]. Worldwide, an estimated 1.26 million hip fractures occurred in adults in 1990, with predictions of numbers rising to 6.26 million by the year 2050 [2] This together with the generally unfavourable outcome in survivors, many of whom end up more dependent and move into residential care, means that the burden on society from hip fractures is immense and increasing [3] Although surgery is generally successful, few people recover fully from their hip fracture [3]. Most survivors fail to regain their former levels of mobility and activity, many become more dependent, and 10 to 60% of survivors will be unable to return to their previous residence [4] [5].	

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>● <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			Not formally assessed. It is assumed that most people place a high value on falls and fall-injury prevention.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Rate of falls	Critical	⊕⊕⊕○ MODERATE	
			Mobility	Critical	⊕⊕○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

<p>□ How substantial are the desirable anticipated effects of the intervention? Large</p> <ul style="list-style-type: none"> <li>• <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p><i>Summary of findings (GRADE):</i></p>	<p>According to the World Health Organization 2020 guidelines on physical activity and sedentary behaviour, [6] the health outcomes associated with participation in physical activity include all-cause and cause-specific mortality, adiposity, cognition, functional ability, mental health and incidence of health conditions including cancer, cardiovascular disease, type 2 diabetes and osteoporosis.</p> <p>Based on this range of benefits of exercise the World Health Organisation guidelines recommend that all older adults should undertake regular physical activity and that older adults should be as physically active as their functional ability allows, and adjust their level of effort for physical activity relative to their level of fitness.</p> <p>In a Cochrane Collaboration systematic review with 40 included studies measuring the effect of mobility interventions in adults after hip fracture (6 of which measured fall outcomes and were considered in this document), mobility interventions lead to a statistically significant, but not clinically significant, benefit to health-related quality of life, a small significant improvement in mobility and there was no evidence of an effect on mortality or fracture. Adverse events related to the intervention were few and not serious [7]</p>
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			Some qualitative research reports people place high value on avoiding pain and loss of mobility with hip fracture.		
		<b>Outcome</b>	<b>With mobility intervention</b>	<b>№ of patients (studies)</b>	<b>Effect Relative / Absolute (95% CI)</b>
		Falls rate (inpatient and post hospital combined)	The mean was 0.19 lower (0.32 lower to 0.03 lower)		RR: 0.81 (0.68-0.97)
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>• <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Mobility – overall analysis Continuous observed outcomes (a higher score indicates better mobility) [(follow-up: range 5 days to 4 months)]	0.39 standard deviations higher (0.08-0.70 higher)	633 (11)	SMD: 0.39 (0.08-0.70)
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>• <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Comments: Based on Cohen's effect sizes, mobility strategies may cause a moderate increase in mobility compared with control (SMD 0.39). Types of intervention in included trials: gait, balance and functional exercise: 8 studies; resistance exercise: 2 studies; electrical stimulation: 1 study.			



<p style="text-align: center;"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
<p style="text-align: center;"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>	<p>Two of the 40 included studies explored the cost of healthcare post hip fracture [8, 9] however neither reported the intervention costs separately. Taraldsen [8] reported health care costs from the broad healthcare perspective (EUR 26219 for intervention group, for exercise program twice/week for ten weeks, 4 mths after hip fracture, c.f. EUR 25976 for the usual care control group. Williams [9] reported the cost of the intervention (six additional home-based exercise sessions), health services and social services from a public sector perspective, with the intervention group cost of GBP 149,243 compared with GBP 105,243 in the control group.</p> <p>Economic modelling for a public health program of fall prevention [10], conducted in community dwelling older people who were not specifically post hip fracture, found that the cost was \$1232.89, however this is likely to underestimate costs of delivery for the intervention and for this population it is likely to require delivery by a physiotherapist.</p>	<p>The intervention costs per person are relatively small compared to the costs associated with reduced mobility (e.g. length of stay, allied health, community services). The intervention costs per person are likely to save healthcare costs overall.</p>

<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>● <b>Varies</b></li> </ul>	<p>In the systematic review, two studies evaluated cost effectiveness.</p> <p>In Taraldsen 2019 [8], the probability that the intervention (additional 20 sessions over 10 weeks of structured, home exercise targeting gait and balance) was cost-effective was below 39% for any ICER ceiling ratio below 150 000 EUR per QALY gained.</p> <p>Williams 2016 [9] did not conduct cost-effectiveness analysis due to the lack of between-group difference in QALY.</p>	<p>The cost-effectiveness is strongly driven by the effectiveness of the individual program.</p>
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Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>● <b>Varies</b></li> </ul>		It is assumed that the effects on equity are likely to vary. In systems where access to post-hospital intervention programs are possible through public funding it may decrease inequities by improving falls outcomes in adults that have not previously had appropriate access to effective interventions.
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>		It is assumed that the acceptability of an exercise program will vary between different patients, programs and settings.

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>		It is assumed that the ability of hospitals and community rehabilitation providers to fund such programs will vary between countries and jurisdictions.
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ●	Strong recommendation for the intervention ○
Recommendation	<p>Recommendation 6: We recommend that older adults after sustaining a hip fracture should be offered an individualised and progressive exercise programme aimed at improving mobility (i.e. standing up, balance, walking, climbing stairs) as a fall prevention strategy. GRADE 1B.</p> <p>Recommendation 7: We conditionally recommend that such programmes for older adults after a hip fracture are best commenced in hospitals and continued in the community. GRADE 2C (In-patients) &amp; 1A (Community)</p>				
Justification	<p>The strength of evidence for exercise in preventing falls in older people post hip fracture is moderate. This recommendation places a relatively high value on preventing falls in this population. This value, plus additional benefits of exercise (see World Health Organisation guidelines), and minimal harms contribute to the justification for a strong positive recommendation.</p> <p>The components of effective fall prevention trials in the community [11] inform the consensus-based recommendations.</p>				
Subgroup considerations	<p>There is a lack of evidence of the effectiveness of exercise specifically in people post-hip fracture with cognitive impairment. Only two studies that measured fall outcomes included participants with cognitive impairment one trial where all 18 participants were aged &gt;90 [12], and another where 54 of the 160 participants had Cognitive impairment with ≥3 adjusted errors on the Short Portable Mental Status Questionnaire [13]. Combining the results of these two studies provided no evidence of an effect of intervention on falls and the certainty of the evidence was assessed as low, using GRADE. Despite uncertainty regarding whether exercise reduces falls in older people with cognitive impairment, the wider benefits of exercise to this population must be considered.</p>				
Implementation considerations	<p>The cost-effectiveness of any program is strongly influenced by the effectiveness of the program.</p> <p>A training program will be required for therapists/exercise providers to ensure they have the expertise in exercise prescription for people following hip fracture.</p> <p>Systems will be required to make affordable exercise options widely available to people post hip fracture.</p> <p>Intervention programs are likely to require specific tailoring and motivational strategies to keep participants post hip fracture engaged in exercise for sufficient dose to see falls prevention effects.</p> <p>Effectiveness of the intervention will drive the cost-effectiveness of the program.</p>				

Monitoring and evaluation	Falls and fall-related injuries should be continuously monitored and evaluated over time with appropriate statistical techniques. The amount and type of physical activity undertaken should also be monitored.
Research Priorities	<ul style="list-style-type: none"> <li>• Sufficiently powered, preferably multi-centred, high quality randomised controlled trials are needed.</li> <li>• Research should focus on interventions that are likely to have a beneficial overall, long-term impact; thus, trials should have long-term (one year or more) and comprehensive follow up including the collection of validated and patient-orientated outcome measures, and economic outcomes.</li> <li>• Research is needed to determine the relative impact of type, dose and location of exercise that is best to reduce falls and the level of supervision required to be optimally effective</li> <li>• Trials need to be conducted in a range of countries with differing health care and community support systems and funding models.</li> <li>• Effect of exercise interventions on fall rates in people cognitive impairment</li> <li>• Cost effectiveness of fall prevention exercise</li> <li>• Effect of exercise on adverse events</li> </ul>

## References

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9. Williams NH, Roberts JL, Din NU et al (2016) Fracture in the Elderly Multidisciplinary Rehabilitation (FEMuR): a phase II randomised feasibility study of a multidisciplinary rehabilitation package following hip fracture. *BMJ Open*. 6:e012422.
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## Recommendations for Working Group 4: Exercise and Falls

**Recommendation 8: We recommend that community-dwelling older adults with cognitive impairment (mild cognitive impairment and mild to moderate dementia) should be offered an exercise programme to prevent falls. GRADE: 1B**

<b>Population:</b>	Older people	<i>Objective: Should exercise versus usual care be used to reduce falls in older people with cognitive impairment?</i>		
<b>Intervention:</b>	Exercise (as a stand-alone intervention) as a falls prevention activity or as a way to improve physical function and balance (trials recording falls as adverse events included)			
<b>Comparison:</b>	Usual care, seated exercise or no exercise (eg. social activity, falls prevention advice)			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Community and residential aged care			
<b>Perspective:</b>	International guidelines: community, residents, clinicians, aged care managers and policy makers			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	Overall, the incidence of falls in older people with CI/dementia is more than twice that of cognitively intact older people [1-3] and the incidence of multiple/recurrent falls is also doubled [4]. Injurious falls are more common, and the risk of hip fracture is increased three to four-fold [5-8]. The risk of institutionalization and death are also increased after a fall in this population, particularly after an injurious fall [5, 7, 9-12]. Few people return to their previous level of function after hip fracture and having CI/dementia is associated with poorer outcomes [13-16].	

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>● <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			Not formally assessed. It is assumed that most people place a high value on falls and fall-injury prevention.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Exercise (overall)	Critical	⊕⊕⊕○ MODERATE	
			Community	Critical	⊕⊕⊕○ MODERATE	
			Residential Care	Critical	⊕⊕⊕⊕ HIGH	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<p>Community</p> <ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul> <p>Residential Care</p> <ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>● <b>High</b></li> </ul>					



<p>How substantial are the desirable anticipated effects of the intervention?</p>	<ul style="list-style-type: none"> <li>• <b>Large</b></li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p><i>Summary of findings (GRADE):</i></p>			<p>Test for subgroup differences: <math>\text{Chi}^2 = 2.12</math>, <math>\text{df} = 1</math> (<math>P = 0.15</math>), <math>I^2 = 53\%</math> ; subgroup analyses also conducted excluding 2 studies ([17] (n=20) , [18](n=110)) where the setting was unclear or where participants from both community and residential care settings were included.</p> <p><b>Adverse events-- undesirable effects</b></p> <p>Out of 13 studies included in our overall meta-analysis, 10 studies reported on adverse events with a varying level of detail. Three studies did not report adverse events [17-19].</p> <p><i>Studies that recorded falls as adverse events / complications</i></p> <p>Four studies, two in the community subgroup [20, 21] and two in the residential care subgroup [22, 23] considered falls as adverse events or complications.</p> <p><u>Community setting</u></p> <p>Lamb (2018) [20] reported 25 adverse events occurred (eight were possibly related, nine probably related, and eight definitely related) and four serious related adverse events (one hospital admission for exercise induced angina, two injurious falls, and one case of substantially worsening hip pain) in the exercise arm and no reports in the usual</p>
<p>How substantial are the undesirable anticipated effects of the intervention?</p>	<ul style="list-style-type: none"> <li>• <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p><b>Outcome</b></p>	<p><b>Nº of participants</b></p>	<p><b>Effect</b></p> <p><b>Relative / Absolute (95% CI)</b></p>	
<p>Does the balance between desirable effects and undesirable effects favour the option of the comparison?</p>	<ul style="list-style-type: none"> <li>• <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<p>Exercise (overall) Rate of falls</p>	<p>1795 (15 comparisons from 13 studies)</p>	<p>0.77 (0.62-0.96)</p>	
		<p>Community Rate of falls</p>	<p>1220 (9 comparisons in 7 studies)</p>	<p>0.71 (0.50-0.99)</p>	
		<p>Residential Care Rate of falls</p>	<p>443 (4 studies)</p>	<p>0.95 (0.77-1.16)</p>	

						<p>care arm. In the exercise arm an adverse event was reported by 23/329 participants (7.0%, 95% CI 4.7% to 10.3%) (note that the program included high intensity aerobic exercise, which might bring more adverse events).</p> <p>Pitkala 2013 [21]: Participants in the control group suffered the most falls per person-year (<math>P&lt;001</math>). The incidences of fractures or hospitalizations did not differ between groups.</p> <p><u>Residential care</u></p> <p>De Souto Barreto 2017 [22] reported less falls (adverse events) in the intervention.</p> <p>Rolland 2007 [23]: Deaths were related to the comorbidities, and none of the deaths were directly or indirectly attributable to an adverse effect of the exercise program.</p> <p>There were no significant group differences during the 12months between the exercise program group and the routine medical care group in observed total number of falls (139 vs 136), fractures (5 vs 2), or deaths (7 vs 8). No malaise or syncope was noted during the exercise sessions. During the study period, five falls occurred during the exercise session. One of them caused a wound of the scalp.</p>
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						<p><i>Studies that did not record falls as adverse events</i></p> <p>Goldberg 2019 [24]: There were 19 recorded adverse events. Five were related to the intervention but not serious, 12 were serious but not related, 2 were neither serious nor related to the intervention. They were all recorded in the active intervention groups, but were subject to ascertainment bias as these groups had much more contact with therapists.</p> <p>Nyman 2019 [25]: Tai Chi was found to be safe with no serious adverse events experienced in relation to practising Tai Chi in class or at home. No serious adverse events were related to participation in the trial.</p> <p>Suttanon 2013 [26]: There were no falls or other serious adverse events associated with performing the exercise programme.</p> <p>Taylor 2021 [27]: There were 4 falls associated with the intervention. One fall occurred while a participant was descending the stairs during an occupational therapy home assessment and 3 participants fell during an exercise session. There were no significant injuries associated with these falls. One participant sustained a small</p>
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						<p>skin tear attempting to complete a knee extension exercise in sitting. No other adverse events were reported.</p> <p>Toots 2019 [28]: All adverse events recorded during exercise sessions were minor or temporary</p> <p>Wesson 2013 [29]: No serious adverse events related to the intervention were reported during the study period. Minor complaints relating to stiffness, dizziness and mild joint pain (n=4; 36%) were reported by participants intermittently and exercises were adjusted accordingly.</p>
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<p style="text-align: center;"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
<p style="text-align: center;"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> <li>● <b>Varies</b></li> </ul>	<p>Only two trials reported on resource use or costs.</p> <p>Pitkala (2013) [21] (community setting) reported costs for the three arms of their exercise RCT:</p> <ul style="list-style-type: none"> <li>- Control group US\$ 34,121 (\$24,559 to \$43,681)</li> <li>- Home exercise: US\$ 25,112 (\$17,642 to 32,581)</li> <li>- Group-based exercise: US\$22,066 (\$15,931 to \$28,199)</li> </ul> <p>The cost of health and social services for the patient-carer dyads (in US\$ per dyad per year) were significantly lower for the group-based exercise compared with the control group (p=0.03) but there was no statistically significant difference between the home-based group and the control group (p=0.13).</p> <p>Nyman (2019) [25](community setting) reported on the costs of:</p> <ul style="list-style-type: none"> <li>-the Tai Chi instructors – total cost : £26,995</li> <li>- the mean cost per intervention group dyad : £631, which was reportedly “markedly higher than dyads’ willingness to pay” (average (SD) £ 5.6 (2.8)) .</li> </ul>	<p>Only two studies to date reported costs of running an exercise intervention to prevent falls in people with cognitive impairment.</p> <p>The first study’s interventions [21] are not representative of other trials (eg. home exercise included a physiotherapist coming the participants’ homes twice a week for 12-months, hence the costs of the home program was higher than the group-based program).The group-based exercise intervention costs for this study were significantly smaller than for the control group. The cost of home-based exercise intervention in this study was not different from the control. The home-based program was more effective.</p> <p>The 2<sup>nd</sup> study [25] only reported on the cost of hiring the instructors.</p>

<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> </ul> <p><b>Varies</b> There does not appear to be any research study that has reported ICER hence there is no evidence.</p>	<p>The cost-effectiveness is strongly driven by the effectiveness of the individual program.</p>
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Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>● <b>Varies</b></li> </ul>	No research found.	<p>It is assumed that effects on equity are likely to vary. In residential care where access is possible through public funding it may decrease inequities by improving falls outcomes in residents that have not previously had appropriate access to effective interventions. In residential care where public funding to deliver the intervention cannot be accessed, and funding is required, implementation may be greater in facilities with higher levels of private funding/staffing and inequities may increase. Similarly, in the community, access varies. Some areas have access to exercise programs to prevent falls, but in some instances, cognitive impairment is an exclusion criterion. In other areas, access to appropriate programs may be limited and/or costly, as well as having exclusions for cognitive impairment.</p>
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<p style="text-align: center;"><b>Acceptability</b></p>	<p>Is the option acceptable to key stakeholders?</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>		<p>It is assumed that it is likely that acceptability of exercise may vary between individuals, their caregivers, settings and program.</p>
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Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● <b>Varies</b></li> </ul>	Realist review on exercise-based falls prevention programmes for older adults with cognitive impairment [30] reported that motivation to undertake the falls prevention interventions in this population was underpinned by two key elements: “perceived benefit” and “support”, from both the participants and carers point of view. “Benefits of exercise perceived by the carer or supporter for the person with dementia include: mood, behaviour, weight, flexibility, ageing, and enjoyment of everyday life.”	It is assumed that the ability for communities and residential care to implement exercise will vary between countries, settings, funding systems and staffing. Feasibility may also depend on the program to be implemented e.g. the successful FINALEX intervention [21] which involved 2h x2/week of home physiotherapy may be difficult to implement in many countries in the community. In contrast, a Tai-Chi intervention similar to that effectively delivered by Nyman [25], that is, once a week in class practice, supplemented by home practice and home behavioural change techniques might be easily implemented using existing community services. The group setting, low infrastructure and equipment requirements may also make it a low-cost intervention.
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ○	Strong recommendation for the intervention ●
Recommendation	Recommendation 8: We recommend that community-dwelling older adults with cognitive impairment (mild cognitive impairment and mild to moderate dementia) should be offered an exercise programme to prevent falls. GRADE: 1B				
Justification	The certainty of evidence for exercise to prevent falls in older people with cognitive impairment living in the community is moderate. This recommendation places a relatively high value on preventing falls in this population. This value, plus additional benefits of exercise (see World Health Organization guidelines [31], perceptions of benefits by carers [30]) and minimal harms contribute to the justification for a positive recommendation.				

Subgroup considerations	<p>Recommendations are made on the basis of subgroup analyses.</p> <p>While residents of care facilities tended to have lower cognitive ability (in 3 out of 4 studies scores for cognitive ability were lower than most scores reported in the cohorts from the community setting), there are many other factors that may differ between the two settings and the people residing in the two settings. The small number of studies prevents us from making recommendations with regards to effectiveness of falls prevention exercise relative to level of cognitive impairment.</p>
Implementation considerations	<p>The studies demonstrating the strongest fall prevention effects both included a strong balance component and involved 50 hours or more of exercise. However while one was home-based and involved two hours, twice weekly exercise supervised by a physiotherapist, for 12-months [21], the other was group-based tai-chi delivered once a week and supplemented with home-based practice. The differential modes of delivery (home vs. group, physiotherapist vs. instructor), frequency of delivery (once versus twice a week) prevent from providing specific recommendations. The study samples also differed: older people with Alzheimer’s disease [21] versus older people with a diagnosis of dementia [25]. While the intended dose for both studies was high (50+ hours), only 7% of participants (n=3) adhered to this dose in the tai-chi intervention. The home-based and group-based multicomponent interventions [21] had high adherence (“The median numbers of session participations were 81 (range, 7-89) in the home-exercise group and 75 (range, 7-89) in the group-exercise group”) but the home-based exercise was most efficacious in preventing falls. Effectiveness of the exercise intervention will drive the cost-effectiveness of the program.</p>
Monitoring and evaluation	<p>Fall rates in residential care can be highly variable. Fall rates in the community can differ by dementia subtype.</p> <p>Falls and fall-related injuries should be continuously monitored and evaluated over time with appropriate statistical techniques. The amount and type of physical activity undertaken should also be monitored.</p>
Research Priorities	<p>Trials to determine:</p> <ul style="list-style-type: none"> <li>-optimal type, dose, mode of delivery and level of supervision of exercise depending in residential care setting</li> <li>-optimal type, dose, mode of delivery and level of supervision of exercise depending on cognitive impairment subtype</li> <li>-cost-effectiveness of fall prevention exercise programs</li> </ul> <p>Trials need to be conducted in a range of countries with differing aged care systems and funding models.</p>

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## Working Group 5: Falls in Hospitals

### Recommendations for Working Group 5: Falls in Hospitals

**Recommendation 1 (Hospital Assessments):** We conditionally recommend performing multifactorial falls risk assessment in all hospitalised older adults >65 years of age. We recommend against using scored falls risk screening tools in hospitals for multifactorial falls assessment in older adults. **GRADE 2B.**

**Recommendation 2 (Hospital Assessment):** We recommend conducting a post-fall assessment in 74 hospitalized older adults following a fall in order to identify the mechanism of the fall, any resulting injuries, any precipitating factors (such as new intercurrent illness, complications or delirium), to reassess the individual's fall risk factors, and adjust the intervention strategy for the 74 hospitalized older adults. **GRADE E.**

<b>Population:</b>	Hospital patients $\geq 65$ years of age	<b>Objective:</b> To review the literature to assess the effectiveness of multifactorial falls risk assessment and falls risk screening tools to prevent falls in hospitalized older adults.		
<b>Intervention:</b>	Multifactorial falls risk assessment			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Acute hospital care setting			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>		

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Fall rate	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>● <b>Small</b></li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 2B</b>				
		<b>Outcome</b>	<b>Intervention</b>	<b>Control</b>		<b>Effect</b> <b>Relative / Absolute (95% CI)</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Fall rate <sup>4</sup>	Fall risk screening tool component and associated summary scores and numerical risk ratings were removed	Fall risk screening tools to detect patients at high falls risk continued as usual	IRR = 0.809 (0.538 – 1.217)	
		Falls rate <sup>5</sup>	Removing a falls risk screening tool from an overall falls risk assessment program Usual care	Falls rate per month IRR = 0.84 (0.67 – 1.05) Falls rate with injuries IRR = 0.90 (0.26 – 3.09)		
		Falls rate in hospitals <sup>6</sup> (aged 55-64)	Multifactorial falls risk assessment, followed by implementation of multidomain interventions	Usual care	IRR = 0.80 (0.64 – 1.01)	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Values and preferences</p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Resources</p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li><input type="radio"/> No studies</li> <li><input checked="" type="radio"/> <b>Very low</b></li> <li><input type="radio"/> Low</li> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> High</li> </ul>	<p>No specific costs mentioned however the intervention involves the removal of a falls risk screening tool and an assessment.</p>	
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li><input type="radio"/> No studies</li> <li><input type="radio"/> Favours the option</li> <li><input checked="" type="radio"/> <b>Probably favours the option</b></li> <li><input type="radio"/> Does not favour either</li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li><input type="radio"/> Varies</li> </ul>		



Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		
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**Should hospitalized patients >65 years of age have a multifactorial falls risk assessment and recommend against using falls risk screening tools in hospitals, as all older hospitalized adults are at risk for falls be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	<p>Recommendation 1: We conditionally recommend performing multifactorial falls risk assessment in all hospitalized older adults &gt;65 years of age. We recommend against using scored falls risk screening tools in hospitals for multifactorial falls risk assessment in older adults. <b>GRADE 2B.</b></p> <p>Recommendation 2: We recommend conducting a post-fall assessment in hospitalized older adults following a fall in order to identify the mechanism of the fall, any resulting injuries, any precipitating factors (such as new intercurrent illness, complications or delirium), to reassess the individual's fall risk factors, and adjust the intervention strategy for the hospitalized older adults. <b>GRADE E.</b></p>				
Justification	Falls risk screening tools and multifactorial falls risk assessments are sometimes used interchangeably, but there are substantial differences. There is a case for divesting from fall risk screening tool scoring, as it does not reduce falls and takes valuable time. Falls risk assessment is a more detailed process used to identify underlying risk factors and inform the development of a care plan to reduce falls and injuries.				
Subgroup considerations	Younger patients (aged 55-64 years) with neurological disorders, stroke, cognitive impairment/delirium, hip fractures, or anyone that clinicians have judged as 'at risk' of falls should also undergo a multifactorial falls risk assessment.				
Implementation considerations	<ul style="list-style-type: none"> <li>• Highlight that a conversation about multifactorial falls risk assessment should occur at admission.</li> <li>• Falls risk assessments should be complete as soon as practical following admission.</li> <li>• Falls risk assessments should be reviewed if there is a change in a patient's condition or if the patient falls.</li> <li>• The results of multifactorial falls risk assessments need to be documented, recorded, and used to formulate the patient care plan.</li> <li>• Clinical reasoning/judgment should be considered when deciding which falls prevention interventions to implement.</li> </ul>				
Monitoring and evaluation	Processes to ensure multifactorial falls risk assessments are being completed in a timely and accurate manner (e.g., regular audits) should be considered.				

Research Priorities	The evidence is sufficient now NOT to investigate the assessment screening tools further in the acute setting, but it should be further investigated in rehabilitation setting. Further research is also warranted on the utility and effectiveness of falls detection technology.
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## Recommendations for Working Group 5: Falls in Hospitals

**Recommendation 1 (Hospitals Management and Interventions): We recommend that a tailored education on falls prevention should be delivered to all hospitalised older adults ( $\geq 65$  years of age) and other high-risk groups. GRADE 1A.**

<b>Population:</b>	Hospital patients $\geq 65$ years of age	<b>Objective:</b> To review the literature to assess whether education (alone or in conjunction with other falls prevention interventions) effectively reduces falls and determine what modes of education are most feasible.		
<b>Intervention:</b>	Tailored patient education			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Hospital care			
<b>Perspective:</b>	Hospital population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>		

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Rate of falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 1A</b>			
			<b>N<sup>o</sup> of patients</b>		
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>
		Falls rate <sup>2</sup>			Hospital and post discharge populations RR = 0.77 (0.69 – 0.87)
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Falls rate <sup>2</sup>			Proportion of fallers who became patients in hospitals RR = 0.78 (0.70 – 0.87)

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		



Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		
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**Should tailored patient education on falls prevention should be delivered to all hospitalized patients  $\geq 65$  years of age and other high-risk groups be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 1: We recommend that a tailored patient education on falls prevention should be delivered to all hospitalised older adults ( $\geq 65$ years of age) and other high-risk groups. GRADE 1A.				
Justification	Some patients initiate risky decisions about mobility based on their own judgements, without always seeking help from nurses or other health professionals. This could be due to a lack of knowledge or behavioural symptoms of delirium and dementia. Patient education is one strategy to address this. Patient education assists patients in self-manage their own falls risk by increasing a person's awareness of their own falls risk and providing them with strategies to mitigate falls whilst hospitalized. Education is usually delivered in conjunction with other strategies (no evidence it works alone).				
Subgroup considerations	This recommendation may not be relevant for people with cognitive impairment, but it may be relevant for their family members/carers [4].				
Implementation considerations	The use of interpreters should be considered when providing education to people from culturally and linguistically diverse backgrounds.				
Monitoring and evaluation	Strategies to evaluate the impact of education packages should be considered.				
Research Priorities	More research is needed to investigate new and innovative strategies and health literacy techniques to provide education (e.g., Teach-back).				

## Recommendations for Working Group 5: Falls in Hospitals

**Recommendation 2 (Hospitals Management and Interventions):** We recommend that personalised single or multidomain falls prevention strategies based on identified risk factors or behaviours or situations be implemented for all hospitalized older adults ( $\geq 65$  years of age), or younger individuals identified by the health professionals as at risk of falls. **GRADE: 1C (Acute care) & 1B (Sub-acute care).**

<b>Population:</b>	Hospital patients $\geq 65$ years of age	<b>Objective:</b> To review the literature to evaluate the effectiveness of falls prevention interventions on reducing falls in hospitalized older adults.		
<b>Intervention:</b>	Falls prevention strategies.			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Hospital care			
<b>Perspective:</b>	Hospital population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● Yes</li> <li>○ Varies</li> </ul>		

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Rate of falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>● <b>Small</b></li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>			* Multidomain intervention in hospitals ** subacute setting *** multidomain interventions on fall risk
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>N<sub>o</sub> of patients</b>		
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Fall rate <sup>5</sup>			* RR = 0.80 (0.64 – 1.01) ** RR = 0.67 (0.54 – 0.83) *** RR = 0.82 (0.62 – 1.09)
		Falls rate (hospital) <sup>9</sup>	Patient and staff education		RaR = 0.70 (0.51 – 0.96) OR = 0.62 (0.47 – 0.83)

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>● <b>Very low</b></li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	Recommendation is against the use of expensive fall risk assessment tools as single interventions.	
	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>● <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		
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**Should appropriate falls prevention strategies be implemented for all hospitalized patients ≥ 65 years of age or younger patients at risk of falls be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 2: We recommend that personalised single or multidomain falls prevention strategies based on identified risk factors or behaviours or situations should be implemented for all hospitalised older adults (≥ 65 years of age), or younger individuals identified by the health professionals as at risk of falls. GRADE: 1C (Acute care) & 1B (Sub-acute care).				
Justification	Developing and implementing a tailored falls prevention plan of care based on the findings of a multifactorial falls risk assessment may reduce falls in hospitals and their associated consequences: including deterioration of patient physical function due to fall-related injuries, social isolation, anxiety and depression, impaired rehabilitation, longer hospital stays and incapacity to return home, as well as increased health and social care costs.				
Subgroup considerations	Falls prevention interventions for patients with cognitive impairment and/or at high risk of delirium should be implemented in consultation with the patient and their family members/careers.				
Implementation considerations	Falls prevention interventions should adjust to the local resources and budget. Most multifactorial falls prevention programs are cost-effective but require time dedication by local staff, which is not always available at organizations with staff shortages or limited resources. In that case, caregivers and family members could assist with some components of the falls prevention program.				
Monitoring and evaluation	Interventions should be monitored on a regular basis to ensure they are implemented as intended and effective.				
Research Priorities	Further studies are warranted to develop/evaluate effective falls prevention interventions that reduce falls in hospitalized older adults, including those with cognitive impairment.				

## Recommendations for Working Group 5: Falls in Nursing Homes

**Recommendation 1 (Care home assessment): We recommend against falls risk screening to identify care home residents at risk for falls, since all residents should be considered at high risk of falls.**

**GRADE: 1A**

<b>Population:</b>	Older adults $\geq 65$ years of age in nursing homes	<i><b>Objective:</b> Nursing home residents have an increased risk of falling due to physical frailty and/or cognitive decline. (Close &amp; Lord, 2011) Hence, they would all benefit from a multifactorial falls assessment and tailored interventions. However, this approach is time and resource-intensive and therefore not always feasible in routine practice. By identifying residents at the highest risk, a multifactorial falls risk assessment and tailored interventions can be offered to those older persons who could benefit most from it. (Nunan et al., 2018) The objective was to review the literature to assess what falls risk screening tool or process should be performed in nursing homes to identify residents with increased fall risk.</i>		
<b>Intervention:</b>	No fall risk screening			
<b>Comparison:</b>	Fall risk screening			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Nursing homes			
<b>Perspective:</b>	Nursing home populations			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>		



<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Rate of falls	Critical	⊕⊕⊕⊕ High	
			Risk of falling	Critical	⊕⊕⊕⊕ High	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>● <b>High</b></li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>● <b>Trivial</b></li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 1A</b>			(Cameron et al, 2018)
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>Nº of patients</b>		
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>● <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Rate of falls	Use of a fall risk-assessment tool	Nurse's judgement alone	RaR = 0.96 (0.84 – 1.10)
		Risk of falling	Use of a fall risk-assessment tool	Nurse's judgement alone	RR = 0.99 (0.85 – 1.16)

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ <b>Very low</b></li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	<p>Recommends against the use of fall risk screening tools, no added cost associated with this recommendation.</p>	
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>● <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

<b>Feasibility</b>	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 1: We recommend against falls risk screening to identify care home residents at risk for falls, since all residents should be considered at high risk of falls. GRADE: 1A				
Justification	There is often confusion between the terms “fall risk screening” and “fall risk assessment” in literature. Screening can be defined as “a process that primarily aims to identify people at increased risk of falls”, whereas assessment can be described as “a process that aims to identify factors that increase the risk of a fall that can be dealt with by subsequent interventions.” (Close & Lord, 2011) There is no evidence that falls risk screening can successfully identify nursing home residents at risk for falls. And because almost all residents have an increased risk of falling and therefore almost all would benefit from a multifactorial falls risk assessment for fall prevention, staff should invest their scarce time in multifactorial falls risk assessments and interventions instead of screening, starting with residents who have a fall history. (Vlaeyen, 2021)				
Subgroup considerations	Not applicable.				
Implementation considerations	Not applicable.				
Monitoring and evaluation	Not applicable.				
Research Priorities	Because current methods have insufficient psychometric properties to predict falls among residents, there is an urgent need for accurate tools. More research on identifying residents with the highest fall risk is warranted, as these residents benefit the most from multifactorial falls risk assessments and subsequent tailored interventions. Innovative technologies may facilitate new perspectives. Therefore, future studies could focus on developing and evaluating smart technologies. In addition, many screening tools are being developed, but too few are validated in different settings, especially nursing homes. (Vlaeyen et al., 2021)				

## Recommendations for Working Group 5: Falls in Nursing Homes

**Recommendation 2 (Care home assessment): We recommend performing a multifactorial falls risk assessment at admission to identify factors contributing to fall risk and implementing appropriate interventions to avoid falls and fall-related injuries in care home older adults. GRADE: 1C.**

<b>Population:</b>	Older adults $\geq 65$ years of age	<b>Objective:</b> <i>The objective was to review the literature to evaluate the effectiveness of falls prevention assessment and interventions on reducing the rate and risk of falling in nursing homes.</i>		
<b>Intervention:</b>	Multifactorial falls risk assessment			
<b>Comparison:</b>	Standard care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Nursing homes			
<b>Perspective:</b>	Nursing home population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● Yes</li> <li>○ Varies</li> </ul>		

<b>Benefits and harms</b> (see below)	Is there Important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE): 1C</i>				
		<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Number of falls (multidomain intervention)		RR = 0.65 (0.45 – 0.94)		
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					



Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 2: We recommend performing a multifactorial falls risk assessment at admission to identify factors contributing to fall risk and implementing appropriate interventions to avoid falls and fall-related injuries in care home older adults. GRADE: 1C.				
Justification	Whilst there is a lack of firm evidence that a multifactorial falls risk assessment and multidomain interventions can successfully reduce the rate and risk of falling in nursing homes, incorporating such a multifactorial falls risk assessment and intervention, where appropriate, is warranted.				
Subgroup considerations	Falls prevention interventions for residents with cognitive impairment should be implemented in consultation with the resident and his family members/caregivers. For palliative care residents, recommendation 2 is not endorsed.				
Implementation considerations	<p>Successful implementation of fall prevention depends on many factors across different healthcare levels. Interventions that assess and take account of the care home context and which empower care home staff and organisations as partners in design and implementation” seems needed. (Logan et al. 2022)</p> <p>The focus of implementation interventions should be on modifiable barriers and facilitators such as communication, knowledge, and skills. Effective fall prevention must consist of multidomain interventions that target each resident’s fall risk profile and should be tailored to overcome context-specific barriers and put into action the identified facilitators. (Vlaeyen et al. 2017)</p> <p>Development of supporting structured tools, such as an implementation plan for fall prevention, could potentially improve the implementation of fall prevention assessment and intervention strategies. (Poels et al. to be submitted)</p> <p>Fall prevention interventions need to incorporate the older person’s beliefs and attitudes towards falls and their management when developing an agreed care plan with them and/or their caregivers.</p> <ul style="list-style-type: none"> <li>• “Guide to Action Care Home” (GtACH) Tool. (Logan, 2019&amp;2021; Robertson, 2012; Walker, 2016)</li> <li>• Logan et al. (2022) confirmed that an intervention, which includes awareness-raising, education, decision, and implementation support, could be a cost-effective way to reduce fall rate in nursing homes without decreasing activity of increasing dependency in residents. The authors state that it is possible that the intervention succeeded because of its comprehensiveness, the empowerment and recognition of the pivotal role played by</li> </ul>				

	<p>care home staff in designing, implementing, and delivering the program. “Evidence Booster: Best Practice Guideline Implementation and Estimated Cost Savings”, RNAO, <a href="https://rnao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-and-estimated-cost-savings">https://rnao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-and-estimated-cost-savings</a></p> <ul style="list-style-type: none"> <li>• “Evidence Booster: Best Practice Guideline Implementation to Reduce Falls in Older Adults”, RNAO, <a href="https://rnao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-reduce-falls-older-adults">https://rnao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-reduce-falls-older-adults</a></li> <li>• Evaluation of the Guide to Action Care Home fall prevention programme in care homes for older people: protocol for a multicenter, single-blinded, cluster randomised controlled trial (FinCH), <a href="https://www.nottingham.ac.uk/emran/documents/issue-25-emran-feb-2019.pdf">https://www.nottingham.ac.uk/emran/documents/issue-25-emran-feb-2019.pdf</a></li> </ul>
Monitoring and evaluation	<p>We recommend performing a multifactorial falls risk assessment at admission to identify factors contributing to fall risk and determine appropriate interventions and follow-up measures to avoid falls and fall-related injuries. This assessment should be repeated at least once annually or when the residents’ condition changes and based on resource availability in each setting.</p>
Research Priorities	<p>More research on fall prevention interventions is needed that include people with cognitive impairment and dementia is to improve the generalizability of these interventions to the typical nursing home resident. (Gulka, 2020)</p>

## Recommendations for Working Group 5: Falls in Nursing Homes

**Recommendation 3 (Care home assessment):** We recommend conducting a post-fall assessment in care home residents following a fall in order to identify the mechanism of the falls, any resulting injuries, to reassess the resident's fall risk factors, adjust the intervention strategy for the resident and avoid unnecessary transfer to hospital. **GRADE: E**

<b>Population:</b>	Older adults $\geq 65$ years of age	<i>Objective: The objective was to review the literature to assess what interventions or processes should occur immediately following a fall in nursing home residents.</i>		
<b>Intervention:</b>	Post-fall assessment			
<b>Comparison:</b>	N/A			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Care homes			
<b>Perspective:</b>	Care home population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>		

<b>Benefits and harms</b> (see below)	Is there Important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	○○○○ N/A	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>	<b>Summary of findings (GRADE):</b>			No evidence provided, only guidelines (RNAO, 2017 & EVV, 2022) on steps to perform was included to support the recommendation.	
		<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
		How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>			
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>● <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● No studies</li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		



Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> Uncertain</li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
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**Should conducting a post-fall assessment in order to avoid unnecessary transfer to acute care following a fall in nursing home residents be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ○	Strong recommendation for the intervention ●
Recommendation	Recommendation 3: We recommend conducting a post-fall assessment in care home residents following a fall in order to identify the mechanism of the fall, any resulting injuries, to reassess the resident’s fall risk factors, adjust the intervention strategy for the resident and avoid unnecessary transfer to hospital. GRADE: E				
Justification	Although there is little evidence for this recommendation, the working group considered this an important recommendation based on expert consensus.				
Subgroup considerations	Not applicable.				
Implementation considerations	<ul style="list-style-type: none"> <li>● AHRQ (Agency for Healthcare Research and Quality). The Falls Management Program: A Quality Improvement Initiative for Nursing Facilities: Chapter 2 Fall response. <a href="https://www.ahrq.gov/patient-safety/settings/long-term-care/resource/injuries/fallsp/2018/man2.html">https://www.ahrq.gov/patient-safety/settings/long-term-care/resource/injuries/fallsp/2018/man2.html</a></li> <li>● “Evidence Booster: Best Practice Guideline Implementation and Estimated Cost Savings”, RNAO, <a href="https://mao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-and-estimated-cost-savings">https://mao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-and-estimated-cost-savings</a></li> <li>● Examples of post-fall assessments: <ul style="list-style-type: none"> <li>○ “Falls Debriefing and Action Plan from St. Joseph’s Healthcare Hamilton (Ontario, Canada)”. (RNAO, 2017. Appendix J.)</li> <li>○ “Post fall protocol for Hampshire County Council Adult Services (NHS England)”. <a href="https://www.nhs.uk/NHSEngland/keogh-review/Documents/quick-guides/background-docs/4-Hampshire%20falls%20protocol.pdf">https://www.nhs.uk/NHSEngland/keogh-review/Documents/quick-guides/background-docs/4-Hampshire%20falls%20protocol.pdf</a></li> </ul> </li> </ul> <p>Post fall multidisciplinary management guidelines for Western Australian Health Care Settings, 2018. <a href="https://www.osrecruitment.health.wa.gov.au/-/media/Files/Corporate/general-documents/Health-Networks/Falls-prevention/WA-Post-Fall-Guidelines_Final_2018_PDF.pdf">https://www.osrecruitment.health.wa.gov.au/-/media/Files/Corporate/general-documents/Health-Networks/Falls-prevention/WA-Post-Fall-Guidelines_Final_2018_PDF.pdf</a></p>				
Monitoring and evaluation	A post-fall assessment should be provided after every fall incident in order to avoid unnecessary transfer to acute care following a fall in nursing home residents.				

Research Priorities	More research is needed regarding the exact content of such a post-fall assessment.
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## Recommendations for Working Group 5: Falls in Hospitals and Nursing Homes

**Recommendation 1 (Care Homes Management and Interventions): We recommend a multifaceted approach to falls reduction for care home residents including care home staff training, systematic use of a multidomain decision support tool and implementation of falls prevention actions. GRADE: 1B**

<i>Population:</i>		<i>Objective:</i>		
<i>Intervention:</i>				
<i>Comparison:</i>				
<i>Main outcomes:</i>				
<i>Setting:</i>				
<i>Perspective:</i>				
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>	<b>Based on expert opinion, No supporting evidence provided for this recommendation.</b>	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>					

<input type="checkbox"/> How substantial are the desirable anticipated effects of the intervention? Large <ul style="list-style-type: none"> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE):</i>					
		<b>Outcome</b>	<b>Nº of patients</b>		<b>Effect</b>	
			<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>					
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

<b>Values and preferences</b>	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	<b>Resources</b>	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>○ Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		



<b>Feasibility</b>	Is the intervention feasible to implement?	<input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Uncertain <input type="radio"/> Probably yes <input type="radio"/> Yes <input type="radio"/> Varies		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation					
Justification					
Subgroup considerations					
Implementation considerations					
Monitoring and evaluation					
Research Priorities					

## Recommendations for Working Group 5: Falls in Nursing Homes

**Recommendation 2 (Care homes management and interventions): We recommend against the use of physical restraints as a measure for falls prevention in care homes. GRADE: 1B**

<b>Population:</b>	Older adults $\geq 65$ years of age	<b>Objective:</b> <i>The objective was to review the literature to assess if physical restraints should be used as a measure for falls prevention in nursing home residents.</i>		
<b>Intervention:</b>	No longer using physical restraints			
<b>Comparison:</b>	Using physical restraints			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Nursing home			
<b>Perspective:</b>	Nursing home population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Fall risk	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>● <b>Small</b></li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 1B</b>			Use of physical restraints act as a proxy for falls risk	
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>		<b>N<sup>o</sup> of patients</b>		<b>Effect</b>	Multicomponent study on reducing physical restraint use vs usual care
		<b>Outcome</b>	<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	
		Physical restraint use (proxy of falls risk)	8002	8935	RR = 0.83 (0.73 – 0.94)	
		Physical restraint use (short term)	2209	2006	RR = 0.86 (0.73 – 1.02)	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Physical restraint use (medium term)	7733	8510	RR = 0.82 (0.69 – 0.98)	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Uncertain <input checked="" type="radio"/> <b>Probably yes</b> <input type="radio"/> Yes <input type="radio"/> Varies		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 2: We recommend against the use of physical restraints as a measure for falls prevention in care homes. GRADE: 1B				
Justification	Based on the evidence, the working group considered this an important issue and recommends against the use of physical restraints as a measure for falls prevention in nursing homes.				
Subgroup considerations	Not applicable				
Implementation considerations	<ul style="list-style-type: none"> <li>Alternative approaches to restraints: Registered Nurses' Association of Ontario. (2012). Promoting safety: Alternative approaches to the use of restraints. Toronto, ON: Author. RAO. ca/bpg/guidelines/promoting-safety-alternative-approaches-use-restraints (RAO, 2017)</li> <li>Evidence Booster: Becoming restraint-free— The impact on falls rate. <a href="https://rno.ca/bpg/resources/evidence-booster-becoming-restraint-free-impact-falls-rate">https://rno.ca/bpg/resources/evidence-booster-becoming-restraint-free-impact-falls-rate</a> (RAO, 2017)</li> </ul>				
Monitoring and evaluation	Not applicable, but the nursing home practice should be monitored on a regular basis to ensure that physical restraints are NOT used as a measure for falls prevention.				
Research Priorities	Considering the findings of Brugnolli et al. (2020), additional studies implementing and evaluating educational programs alone or with consultation/guidance might offer additional evidence of the effectiveness of these programs on reducing physical restraints use in nursing homes.				

## Recommendations for Working Group 5: Nursing Homes

**Recommendation 3 (Care Homes Management and Interventions): We recommend nutritional optimisation including food rich in calcium and proteins, as well as vitamin D supplementation as part of a multidomain intervention for falls prevention in care home residents. GRADE: 1B**

<i>Population:</i>	Older adults $\geq 65$ years of age in nursing homes	<i>Objective: The objective was to review the literature to assess if vitamin D supplementation should be given as part of a multidomain intervention for falls in nursing home residents.</i>		
<i>Intervention:</i>	Vitamin D supplementation			
<i>Comparison:</i>	No vitamin d			
<i>Main outcomes:</i>	Falls			
<i>Setting:</i>	Nursing homes			
<i>Perspective:</i>	Nursing home population			
Decision Domain		Judgements	Research Evidence	Additional Considerations / Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● Yes</li> <li>○ Varies</li> </ul>		



Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● Probably no important uncertainty of variability</li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			Outcome	Relative Importance	Certainty of the evidence (GRADE)	
			Rate of falls	Critical	⊕⊕⊕○ MODERATE	
			Risk of falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● Moderate</li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE): 1B</i>				
			№ of patients			Effect
		Outcome	Intervention	Control		Relative / Absolute (95% CI)
		Rate of falls (Cameron et al. 2018)				RaR = 0.72 (0.55 – 0.95) I <sup>2</sup> = 62%
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Risk of falling (Cameron et al. 2018)			RR = 0.92 (0.76 – 1.12) I <sup>2</sup> = 42%	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li><input type="radio"/> No studies</li> <li><input type="radio"/> Very low</li> <li><input checked="" type="radio"/> Low</li> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> High</li> </ul>		
	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li><input type="radio"/> No studies</li> <li><input type="radio"/> Favours the option</li> <li><input checked="" type="radio"/> Probably favours the option</li> <li><input type="radio"/> Does not favour either</li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li><input type="radio"/> Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> Uncertain</li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● Yes</li> <li>○ Varies</li> </ul>		
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**Should vitamin D supplementation as part of a multidomain intervention for falls prevention in nursing home residents be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ●	Strong recommendation for the intervention ○
Recommendation	Recommendation 3: We recommend nutritional optimisation including food rich in calcium and proteins, as well as vitamin D supplementation as part of a multidomain intervention for falls prevention in care home residents. GRADE: 1B				
Justification	Although there is moderate evidence that vitamin D supplementation can reduce falls in aged care residents, there is a lack of firm evidence for its role as part of a holistic multifactorial fall's prevention intervention is warranted in older nursing home residents. Although there is moderate evidence that vitamin D supplementation can reduce falls in aged care residents, there is a lack of firm evidence for its role as part of a holistic multifactorial fall's prevention intervention				
Subgroup considerations	Not applicable.				
Implementation considerations	Implementing vitamin D supplementation as part of a multidomain intervention for falls in nursing home residents is complex in the nursing home setting despite the relatively low cost. Walker et al. (2020) aimed to increase vitamin D supplement use uptake in Australian residential aged care facilities by evaluating a range of strategies to support implementation. They concluded that some strategies appeared to be associated with better outcomes, but the overall impact was limited and recommended that the role of organizational and governmental support for implementation should be investigated further.				
Monitoring and evaluation	We recommend performing a multifactorial falls risk assessment at admission to identify factors contributing to fall risk and determine appropriate interventions and follow-up measures to avoid falls and fall-related injuries. This assessment should be repeated at least once annually or when the residents' condition changes and based on resource availability in each setting and should include vitamin D supplementation.				
Research Priorities	Increasing the implementation and uptake of vitamin D supplements should be a research priority. (Walker et al. 2020). More studies are needed to investigate the effect of vitamin D supplementation on falls in older nursing home residents				

## Recommendations for Working Group 5: Falls in Nursing Homes

**Recommendation 4 (Care Homes Management and Interventions): We recommend including the promotion of exercise training (when feasible and safe) as part of a multidomain falls prevention intervention in care homes. GRADE: 1C**

<b>Population:</b>	Older adults $\geq 65$ years of age	<b>Objective:</b> <i>The objective was to review the literature to assess if physical activity should be given as part of a multidomain intervention for falls in nursing home residents.</i>		
<b>Intervention:</b>	Physical exercise			
<b>Comparison:</b>	No exercise			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Nursing home			
<b>Perspective:</b>	Nursing home population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Fall prevention	Critical	N/A	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>● No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>	<b>Summary of findings (GRADE):</b>			Provided references do not cover the topic of falls prevention.	
		<b>Outcome</b>	<b>N<sup>o</sup> of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
		How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>			
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>● <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					



Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ○	Strong recommendation for the intervention ●
Recommendation	Recommendation 4: We recommend including the promotion of exercise training (when feasible and safe) as part of a multidomain falls prevention intervention in care homes. GRADE: 1C				
Justification	Although there is little evidence for this recommendation, the working group considered this an important recommendation based on expert consensus.				
Subgroup considerations	There are specific moderate exercise programs that could be implemented and tailored to residents living with dementia, which have demonstrated high level of adherence, and could slow the progressive deterioration in ability to perform AD's in this population.				
Implementation considerations	<ul style="list-style-type: none"> <li>● “Evidence Booster: Best Practice Guideline Implementation and Estimated Cost Savings”, RNAO, <a href="https://mao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-and-estimated-cost-savings">https://mao.ca/bpg/resources/evidence-booster-best-practice-guideline-implementation-and-estimated-cost-savings</a></li> <li>● “Guidelines on Physical Activity and Sedentary Behavior” WHO, Chapter “Adoption, dissemination, implementation and evaluation, <a href="https://www.who.int/publications/i/item/9789240015128">https://www.who.int/publications/i/item/9789240015128</a>, p 70-75</li> </ul>				
Monitoring and evaluation	Falls and injury rate, amount and type of physical activity participation as well as health conditions, disease severity and dementia sub-types if applicable, should be monitored through national surveys and audits.				
Research Priorities	Studies evaluating the effectiveness and feasibility of physical activity (on fall-related outcomes) in nursing homes are needed to develop informed guidelines and recommendations for addressing sedentary behavior.				

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## Working Group 6: Falls and Cognition

### Recommendations for Working Group 6: Falls and Cognition

**Recommendation 1 Assessment): We recommend that routine assessment of cognition should be included as part of multifactorial falls risk assessment in older adults. GRADE: 1B**

<b>Population:</b>	Older adults	<i>Objective: Over one third of community-dwelling older adults experience at least one fall each year and the occurrence of falls rises steadily with age. However, this rate is doubled in older adults with cognitive impairment [1]. Older adults with cognitive impairments are admitted to institutional care facilities five times more often than older adults without cognitive impairment because of a fall [3]. The length of hospital stay is at least nine days longer than the average length of stay for all causes of hospitalization in Canada [4]. They are also at high risk of major falls-related injuries (e.g., fracture and head injuries) and mortality [5]. The objective was to review the literature to assess the extent to which cognitive impairment contributes to falls and falls injury risk and if cognitive assessment should be recommended as part of standard falls risk assessment protocols.</i>		
<b>Intervention:</b>	Cognition assessment			
<b>Comparison:</b>	No cognition No comparison			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Community-dwelling older adults			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>➤ <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Falls with serious injury	Critical	⊕⊕⊕○ MODERATE	
			Falls with fractures	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>➤ <b>Moderate</b></li> <li>○ High</li> </ul>					



<input type="checkbox"/> How substantial are the desirable anticipated effects of the intervention? <ul style="list-style-type: none"> <li>Large</li> <li>➤ <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):1B</b>			Montero Odasso et al., 2021 reported GRADE for the included guidelines=1A * Community-dwelling older adults ** long-term care facilities			
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>➤ <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>Nº of patients</b>		<b>Effect</b>	No data available on harms that are related to cognitive assessment.	
		<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>			
		Falls Risk	From systematic review and meta-analysis (n=8191)	From systematic review and meta-analysis (n=18219)	OR=1.33 (1.18– 1.49) * OR: 1.88 (1.54 – 2.30) **		
		Falls-related injury	From systematic review and meta-analysis (n=1246)	From systematic review and meta-analysis(n=16572)	OR=2.33 (1.61, 3.36)		
		Falls resulting in a fracture	From systematic review and meta-analysis(n=1233)	From systematic review and meta-analysis(n=13919)	RR=1.78 (1.34, 2.37)		
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>➤ <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours</li> </ul>	Risk of falls related injury (global cognitive impairment)			OR: 2.13 (1.56 – 2.90)		

		<p>the comparison</p> <ul style="list-style-type: none"> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<p>Risk of falls related injury (Executive function impairment)</p>			<p>OR: 1.44 (1.20 – 1.73)</p>	
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Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>➤ <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>	Number of clinical practice guidelines recommended to address cognitive impairment during falls risk assessment and management in both community setting and clinical practice. However, there is limited evidence of patient value and preference on falls.	
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>➤ <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>	There are freely available cognitive tests (ie. MoCA and TMT A & B).
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>➤ <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Cognitive tests such as MoCA and TMT A & B are freely available. Assessing cognitive impairment during falls risk assessment could prevent falls and falls-related injury, reducing the healthcare costs in long-term.	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>➤ <b>Uncertain</b></li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>○ Varies</li> </ul>	Some cognitive tests are time-consuming and requires specialized training. These tests may not be applicable for the clinics or settings with low resources.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>➤ <b>Yes</b></li> <li>○ Varies</li> </ul>	Number of clinical practice guidelines recommended to address cognitive impairment during falls risk assessment and management in both community setting and clinical practice.	

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>➤ <b>Yes</b></li> <li>○ Varies</li> </ul>	There are freely available cognitive tests (ie. MoCA and TMT A & B) and requires no specialized training. Both MoCA and TMT A & B are easy to perform and takes less than 10 minutes to complete. The MoCA and TMT A and B are recommended as at minimum-battery to assess cognition function.	
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**Should assessment of cognition be included as part of multifactorial falls risk assessment in older adults?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ○	Strong recommendation for the intervention ●
Recommendation	Recommendation 1: We recommend that routine assessment of cognition should be included as part of multifactorial falls risk assessment in older adults. GRADE: 1B				
Justification	There is moderate evidence that low cognitive performance, even in those not clinically labelled as cognitively impaired, is associated with higher risk of falls and injuries due to falls [6]. Specifically, in those with cognitive impairment and a clinical diagnosis of mild cognitive impairment or dementia, falls are associated with greater occurrence of injury, disability, and hospitalization [5,6]. Therefore, cognitive assessment must be an essential component of any multifactorial fall assessment.				
Subgroup considerations	Our recommendations apply to all the settings including hospitals and nursing homes, and aligns with recommendation from nursing homes and hospitalized patients (working group 5) and multidomain intervention (working group 10).				
Implementation considerations	The global cognitive impairment assessed by the Mini-Mental State Exam (MMSE) and executive function impairment measured using the Trial Making Test B (TMT-B) and a computerised neuropsychological test battery (NTB) are associated with an increased falls risk [4]. In high functional older adults, global cognitive tests that have more items representing executive function, like MoCA test, will be better to detect subtle impairment. The screening tools like MoCA are available in multiple languages and has been recently recommended as global cognition test for assessing an interaction between mobility, cognition, and falls, although limitations regarding education bias have been acknowledged [9]. Cognitive test battery including the MoCA, TMT A and B, Digit Symbol Substitution Test, Stroop test, and Rey Auditory Verbal Learning Test could be a successful screening tools if feasible [10]. In settings where formal neuropsychological testing is not available, the MoCA and TMT A and B should be considered [10]. It is important that the assessors are trained to administer cognitive tests in a standard manner.				
Monitoring and evaluation	We could not find high level evidence for how frequently cognition should be assessed or monitored in older adults in clinic or community settings. Experts believe that cognition should be an integral part of any multifactorial falls risk assessments. For instance, if a multifactorial falls risk assessment is performed every year, then cognition should also be tested at the same visit or frequency. Education level need to be considered when selecting and interpreting cognitive assessments, as part of the fall assessment.				

Research Priorities	<p>The clinical validity and utility of cognitive assessments (general mental status as well as specific cognitive domains) in the context of falls prevention studies need to be established. Future fall prevention studies need to be more inclusive of cognitively impaired participants particularly early dementia stage since this is a population at higher risk of falling with relatively preserved mobility independence in the community. There is also a need for identifying unique risk factors for falls in cognitively impaired patients with a view of developing targeted pragmatic interventions (e.g. inclusion of participant's choice of the intervention, taking into consideration the physical limits of a participant, involving caregivers in delivering the intervention, training health care workers on how to deliver the intervention) in this at-risk population</p>
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## Recommendations for Working Group 6: Falls and Cognition

**Recommendation 2 (Assessment):** We recommend including both the older adults and caregiver’s perspective, when creating the individual falls prevention care plans for adults with cognitive impairment since this strategy has shown better adherence to interventions and outcomes. **GRADE: 1C.**

<b>Population:</b>	Older adults with cognitive impairment (mean age 82.2 ±7.5 years, F (72%), MoCA<24)	<b>Objective:</b> To review the literature to evaluate whether patients and /or caregivers should be involved in ascertaining fall history and planning falls risk reduction strategies.		
<b>Intervention:</b>	Multifactorial falls risk assessment			
<b>Comparison:</b>	None			
<b>Main outcomes:</b>	Number of Falls/fallers (n=24)			
<b>Setting:</b>	Long-term care homes, community, hospital			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	<p>Our rapid review with 6 randomized controlled trials (RCT)[2, 8-12] with older adults exhibiting cognitive impairment reveals that involving caregivers in creating, implementing, and evaluating the care plan for falls risk reduction have better adherence [1]. However, caregiver involvement was identified as incidental findings in these studies and has limited level of evidence.</p> <p>An included study in the rapid review [2], pointed out that caregiver involvement is important for people living in long-term care homes as the staff turnover is higher in residential care facilities) and care plans are often not implemented properly if only staff are involved.</p> <p>6 out of 6 studies in the rapid review [1] stressed involving caregivers when implementing life style modification interventions such as dietary modification, vitamin D prescription, regular exercise and avoiding movement during sundowning (a clinical state of confusion characterized by early evening disruptive behaviours such as agitation, restlessness, irritability, disorientation, and being demanding and suspicious [3]) for people with mild to moderate cognitive impairment living in the community.</p> <p>All studies included in the scoping review [1] recommended involving caregivers in documenting a history of falls, especially in people with cognitive impairment who tend to</p>	

			underreport falls due to impaired memory.	
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<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>● <b>No important uncertainty of variability</b></li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Concerns about falling	Critical	⊕⊕⊕○ MODERATE	
			Balance	Critical	⊕⊕⊕○ MODERATE	
			Functional mobility	Critical	⊕⊕⊕○ MODERATE	
			Number of falls	Critical	⊕○○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> </ul>	<b>Summary of findings (GRADE): 1B</b>	* (Racey et al., 2021)
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the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>Nº of patients</b>		<b>Effect</b>	
			<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	
			Concerns about falling*			SMD= -0.73 (1.10, -0.36)
			Balance*			SMD= 0.66 (0.19, 1.12)
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Functional mobility (timed up and go) *			SMD= 0.56 (-0.94, -0.17)	
		Number of falls			RR= 0.99 (0.60, 1.65)	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>● <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

<p style="text-align: center;"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	<p style="text-align: center;"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ No studies</li> <li>● <b>Very low</b></li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	<p>One study evaluated cost effectiveness but used hospitalization as a proxy indicator.</p>
<p>Does the cost effectiveness favour the intervention or the comparison?</p>		<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<p>Exercise was delivered in a group setting (N=10) as part of standard of care. Exercise was delivered by the caregivers at home (N=6) with no cost.</p>	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>➤ <b>Probably increased</b></li> <li>○ Uncertain</li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>○ Varies</li> </ul>	Older adults could enjoy exercise intervention without going to a Gym.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>➤ <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>	Adherence was better when caregivers were involved	

Feasibility	Is the intervention feasible to implement?	<input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Uncertain <input checked="" type="radio"/> <b>Probably yes</b> <input type="radio"/> Yes <input type="radio"/> Varies	No adverse event was reported	
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**Should the inclusion of both, patients and caregivers perspective, when creating the individual falls prevention care plans for older adults with cognitive impairment since this strategy has shown better adherence to interventions and outcomes be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 2: We recommend including both the older adults and caregiver’s perspective, when creating the individual falls prevention care plans for adults with cognitive impairment since this strategy has shown better adherence to interventions and outcomes. GRADE: 1C.				
Justification	Although there is Low level of evidence for this recommendation, the working group considered this an important recommendation based on the rapid review conducted by the working group in 2022.				
Subgroup considerations	Our recommendations only apply to patients with cognitive impairment.				
Implementation considerations	<ul style="list-style-type: none"> <li>Caregivers should be involved when evaluating a history of falls in patients with cognitive impairment.</li> <li>Clinicians involved in care of people with cognitive impairment living in the community or in assisted care facilities should follow the STEADI Algorithm for Fall Risk Screening, Assessment, and Intervention [4] and involve caregivers in the assessment, risk factor education, patient education, evaluation, care planning, care implementation, and care evaluation process.</li> <li>Clinicians should follow the Stages of Change model [5] to assess the readiness of the patient and their caregiver to act on a new, safer behavior.</li> </ul>				
Monitoring and evaluation	Overall, all 28 studies included in our rapid review [1], suggested the importance of monitoring and evaluation of care plans involving falls risk reduction as adherence to these plans can vary.				
Research Priorities	Further research should focus on falls reduction in people with cognitive impairment given that we found that only 28 29 of 2,559 original research on fall reduction included people with cognitive impairment. Only 3 4 of these 28 29 papers included people with diagnosed dementia. Clearly, given their increased fall risk [6,7] compared to those with no cognitive impairment, older adults with cognitive impairment merit much greater focus in fall risk assessment and intervention research.				

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## Working Group 7: Falls and Parkinson's disease

### Recommendations for Working Group 7: Falls and Parkinson's disease

**Recommendation 1 (Assessment): We conditionally recommend a falls risk assessment for older adults with Parkinson's Disease, including a self-report 3-risk factor assessment tool, which includes a history of falls in the previous year, freezing of gait (FOG) in the past month, and slow gait speed. GRADE: 2B**

<i>Population:</i>	Older adults with Parkinson's disease	<i>Objective:</i>		
<i>Intervention:</i>	N/A			
<i>Comparison:</i>	N/A			
<i>Main outcomes:</i>	Falls			
<i>Setting:</i>	Any setting			
<i>Perspective:</i>	Population with PD			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
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					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>● <b>Very low</b></li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>			○○○○ MODERATE		

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>	<i>Summary of findings (GRADE): 2C</i>			HR = hazard ratio	
		<b>Outcome</b>	<b>N<sub>o</sub> of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
		New fall after enrolment <sup>3</sup>	2063 (PD)	2063		HR = 1.8 (1.6 – 2.0)
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>					
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>● <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					



Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input checked="" type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation	Recommendation 1: We conditionally recommend a falls risk assessment for older adults with Parkinson’s Disease, including a self-report 3-risk factor assessment tool, which includes a history of falls in the previous year, freezing of gait (FOG) in the past month, and slow gait speed. the past month and 3) slow gait, i.e., a timed gait speed of less than 1.1 m/s in addition to fall risk factors relevant to older adults in general. GRADE: 2B				
Justification					
Subgroup considerations					
Implementation considerations					
Monitoring and evaluation					
Research Priorities					

## Recommendations for Working Group7: Falls and Parkinson’s disease

**Recommendation 1 (Management and Intervention): We conditionally recommend that older adults with Parkinson’s disease should be offered multidomain interventions, based on PD specific assessment and other identified falls risk factors. GRADE: 2B**

<i>Population:</i>	Older adults with Parkinson’s disease	<i>Objective:</i>		
<i>Intervention:</i>	Multidomain interventions			
<i>Comparison:</i>	Usual care			
<i>Main outcomes:</i>	Falls			
<i>Setting:</i>	Any setting			
<i>Perspective:</i>	PD population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● Yes</li> <li>○ Varies</li> </ul>		

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Fall frequency	Critical	⊕○○○ Very Low	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>● <b>Very low</b></li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>	<i>Summary of findings (GRADE): 2C</i>			
			<b>N<sub>o</sub> of patients</b>		
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>● <b>Don't know</b></li> </ul>	<b>Outcome</b>	<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>
		Fall frequency	9	10	multimodal group had a significant ( $Z \geq 2.21$ , $P \leq .02$ ) reduction in 30-day fall frequency <sup>2</sup>
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>● <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>				

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>		
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>● No studies</li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		



Feasibility	Is the intervention feasible to implement?	<input type="radio"/> No <input type="radio"/> Probably no <input checked="" type="radio"/> <b>Uncertain</b> <input type="radio"/> Probably yes <input type="radio"/> Yes <input type="radio"/> Varies		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input checked="" type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation	Recommendation 1: We conditionally recommend that older adults with Parkinson’s disease should be offered multidomain interventions, based on PD specific assessment and other identified falls risk factors. GRADE: 2B				
Justification					
Subgroup considerations					
Implementation considerations					
Monitoring and evaluation					
Research Priorities					

## Recommendations for Working Group7: Falls and Parkinson’s disease

**Recommendation 2 (Management and Intervention):** We recommend that older adults with Parkinson’s Disease at an early to mid-stage and with mild or no cognitive impairment should be offered individualized exercise programmes including balance and resistant training exercise. **GRADE: 1A** (see working group 4 for more details on recommendation for exercise)

**Recommendation 3 (Parkinson’s Management and Interventions):** We conditionally recommend offering exercise training, targeting balance and strength to adults with complex phase Parkinson’s Disease if supervised by a physiotherapist or other suitably qualified professional. **GRADE: 1C**

<b>Population:</b>	Older adults with Parkinson’s disease	<b>Objective:</b> To reduce the rate and number of falls in people with PD without substantial cognitive impairment.		
<b>Intervention:</b>	Exercise			
<b>Comparison:</b>	Standard care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Any setting			
<b>Perspective:</b>	PD population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● Yes</li> <li>○ Varies</li> </ul>		

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕⊕ HIGH	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>● <b>High</b></li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 1A</b>				
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>N<sub>o</sub> of patients</b>		<b>Effect</b>	<p>Freezing of gait (FOG)</p> <p>Teaching FOG prevention strategies: ES = -0.35 (-0.56, -0.13)</p> <p>Exercise targeting FOG-relevant compensatory systems to enhance the resilience for FOG: ES = -0.40 (-0.64, -0.16)</p> <p>Exercise on FOG: ES = -0.46 (-0.76, -0.17)</p>
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	
		Rate of falls (exercise)			RR = 0.65 (0.53 – 0.80)	
		Number of fallers (exercise)			RR = 0.90 (0.82 – 1.00)	
		Rate of falls (fully supervised exercise)			RR = 0.56 (0.41 – 0.77)	
		Rate of falls (partially supervised exercise)			RR = 0.85 (0.75 – 0.97)	
		Number of fallers (higher disease severity)			RR = 1.19 (1.00 – 1.41)	

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>○ <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	<p>Specific cost of the exercise intervention not mentioned.</p>	
	<p>Does the cost effectiveness favour the intervention or the comparison?</p>	<ul style="list-style-type: none"> <li>○ <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should exercise be recommended for people with mild to moderate PD without substantial cognitive impairment for falls prevention?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	<p>Recommendation 2: We recommend that older adults with Parkinson’s Disease at an early to mid-stage and with mild or no cognitive impairment should be offered individualised exercise programmes including balance and resistance training exercise. GRADE 1A.</p> <p>Recommendation 3: We conditionally recommend offering exercise training, targeting balance and strength to adults with complex phase Parkinson’s Disease if supervised by a physiotherapist or other suitably qualified professional. GRADE 1C.</p>				
Justification					
Subgroup considerations					
Implementation considerations					
Monitoring and evaluation					
Research Priorities					

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## Working Group 8: Falls and Technology

### Recommendations for Working Group 8: Technology

**Recommendation 1 (Interventions): We conditionally recommend using telehealth and/or smart home systems (when available) in combination with exercise training as part of falls prevention programmes in the community. GRADE: 2C**

<b>Population:</b>	Older adults	<b>Objective:</b> To determine if telehealth helps to prevent or reduce falls, with or without exercise in the community.		
<b>Intervention:</b>	Telehealth and/or smart home system with/out exercise			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Community-dwelling older adults			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>		

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕○○ LOW	
			Fall Risk	Critical	⊕⊕○○ LOW	
			Fall efficacy	Critical	⊕⊕○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 2C</b>				
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>N<sub>o</sub> of patients</b>		<b>Effect</b>	<p>Chan J. et al 2021, “The effectiveness of e-interventions on fall, neuromuscular functions and quality of life in community-dwelling older adults: A systematic review and meta-analysis”.</p> <p><a href="https://doi.org/10.1016/j.ijnurstu.2020.103784">https://doi.org/10.1016/j.ijnurstu.2020.103784</a></p>
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>● Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>	
		Telehealth + exercise	693	626	RR: 0.84 (0.73 – 0.97) I <sup>2</sup> = 26%	
		Smart home system	145	145	RR: 0.58 (0.44 – 0.77) I <sup>2</sup> = 0%	
		Telehealth only	448	443	RR: 0.80 (0.60 – 1.08) I <sup>2</sup> = 73%	
		Total (Telehealth + exercise + smart home systems)	1286	1214	RR: 0.79 (0.70 – 0.90) Heterogeneity: I <sup>2</sup> = 44% Subgroup differences: I <sup>2</sup> = 63.3%	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>● <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>	E-interventions increase cost effectiveness for patients, after initial set up cost's telehealth is effective in cost-saving.	Chan et al., 2021
	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should using telehealth and/or smart home systems (when available) alone or in combination with physical exercise to feed falls prevention programs in the community be conditionally recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input checked="" type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation	Recommendation 1: We conditionally recommend using telehealth and/or smart home systems (when available) in combination with exercise training as part of the falls prevention programmes in the community. GRADE: 2C				
Justification					
Subgroup considerations					
Implementation considerations					
Monitoring and evaluation					
Research Priorities					



## Recommendations for Working Group 8: Technology for Using Wearable Technology for Fall Prevention and Detection

**Recommendation 2 (Interventions): Current evidence does not support the use of wearables for falls prevention. However, emerging evidence show that when wearables are used in exercise programmes to prevent falls, they may increase participation. GRADE: 2C**

<b>Population:</b>	Older adults aged $\geq 60$ years	<b>Objective:</b> With a rise in technology-assisted health monitoring, fall prevention and detection are more feasible and accessible. The use of technology in the clinic for fall risk assessment, interventions, or fall detection is growing. The objective was to review the literature to assess the current evidence for the effectiveness of wearable technology in detecting and preventing falls in older adults.		
<b>Intervention:</b>	Any physical exercise intervention that includes wearable technology			
<b>Comparison:</b>	Intervention without wearable technology			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Any setting			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>➤ <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>➤ <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			We only included studies with Falls as the main outcome or also Balance as the main outcome, we do not have sufficient data for the other outcomes in this table.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Mobility	Critical	N/A	
			Activities of daily living	Critical	N/A	
			Cognitive function	Critical	N/A	
			Quality of life	Critical	N/A	
			Gait speed	Critical	N/A	
			<b>Falls</b>	Critical	⊕⊕⊕○ MODERATE	
			Balance	Critical	⊕⊕○○ LOW	
			Health Service Use	Critical	N/A	
	What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>➤ <b>Moderate</b></li> </ul>				

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>➤ <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 2C</b>				
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>➤ <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Study</b>	<b>Nº of patients</b>	<b>Outcome</b>	<b>Effect</b>	None of the studies listed adverse effects and there is limited information on harms.
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>➤ <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Harris et al 2018	C = 338 I = 339 I+nurse = 346	Fall occurrence – number of falls	Number of falls (%) Post_C = 22% Post_I = 18% Post_I+nurse = 14% <b>p = 0.02*</b>	
		Oliveira et al 2019	C = 67 I = 64	Fall occurrence – odds ratio	Odds ratio OR = 2.0 95% CI = 1.1-3.7 <b>“significant”</b>	
		Schwenk et al 2014	C = 16 I = 17	Balance outcome – Timed Up and Go (TUG)	Improvement in TUG <b>p = 0.024*</b>	
		Carpinella et al 2017	C = 20 I = 17	Balance outcome – Berg Balance Scale (BBS)	BBS Mean (SD) Post_C = 43.8 (10.9) Post_I = 50.0 (6.2) <b>p = 0.047*</b>	

<p style="text-align: center;"><b>Values and preferences</b></p>	<p>Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes?</p> <p>Also include adverse effects and burden of the intervention</p>	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>➤ <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>	<p>Fall reduction is likely a shared value between all stake holders.</p>	
	<p style="text-align: center;"><b>Resources</b></p>	<p>What is the certainty of the evidence of resources requirements (costs)?</p>	<ul style="list-style-type: none"> <li>➤ <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	<p>Not enough evidence</p>
<p>Does the cost effectiveness favour the intervention or the comparison?</p>		<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>➤ <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<p>Not enough evidence</p>	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li>○ Increased</li> <li>○ Probably increased</li> <li>➤ <b>Uncertain</b></li> <li>○ Probably reduced</li> <li>○ Reduced</li> <li>○ Varies</li> </ul>	Depending on the technology, commercialized products could increase access to interventions by integrating pedometers and exergames. However, certain technology may be more expensive and would not be as accessible.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>➤ <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>	Simple wearable technology is likely to result in higher adherence and acceptability as it is less burdensome to the participants and the care providers.	

<b>Feasibility</b>	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	Depending on the type of wearable technology, implementing the intervention should be as feasible as an intervention without wearable technology. If the technology is more complex, feasibility may be reduced.		
<b>Should the use of wearable technology to improve fidelity to exercise programs if there are any available be conditionally recommended for older adults to prevent and manage falls?</b>					
Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input checked="" type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation	Recommendation 2: Current evidence does not support the use of wearables for falls prevention. However, emerging evidence show that when wearables are used in exercise programmes to prevent falls, they may increase participation. GRADE: 2C				
Justification	The evidence for using wearables for falls detection and prevention is available in research settings, however it has not been translated yet to the clinical encounter. Gait and balance assessment via sensors have the potential to be biomarkers for fall risk. These RCTs and cohort studies indicate that technology such as accelerometry is potentially useful to complement conventional clinical assessment, for balance-improvement interventions, and overall, for preventing falls.				
Subgroup considerations	None.				
Implementation considerations	Primary care clinicians should inform their older, community-dwelling adults about physical activity interventions with wearable technology to prevent and manage falls. The preferences and values of older people at risk for falls should be considered when discussing the type of physical exercise intervention				
Monitoring and evaluation	We do not have enough randomized control trials to draw concrete conclusions on the best way to monitor and evaluate the main outcomes.				

Research priorities	More RCTs that use technology to improve fall risk assessment are warranted. A near-future goal could be forming a consensus on identifying objective biomarkers of fall-risk via gait and balance assessment. Additionally, larger, and more diverse open-source fall repositories are encouraged to better enable generalizable machine learning methods as there is likely a problem of over-fitting in the current studies. There is growing literature on the use of sensors to quantify performance in physical function assessments such as timed-up and go tests and gait analysis. Careful consideration should be given to the complexity of the technology; simplicity will likely result in higher adherence. Often laboratory simulations do not map to situations experienced in real-life and hence testing fall-detection should extend to real-world scenarios to improve accuracies and reduce false alarms. It is important to develop algorithms robust for use in the clinic, nursing homes, and the community.
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## Working Group 9: Falls in Low- and Middle-Income Countries

### Recommendations for Working Group 9: Falls in Low- and Middle-Income Countries

#### Recommendation 1 (Implementation): Local context needs to be considered when implementing fall prevention programmes in low- and middle-income countries. GRADE: 1B

<b>Population:</b>	Older adults $\geq 60$ years of age	<p><i><b>Objective:</b> Resources may be limited and variable depending on the setting and local context. Falls in older adults is given a low priority in lower-middle-income countries (LMICs) due to competing priorities in terms of ongoing threats of tropical and communicable diseases and the emerging threats of non-communicable disorders<sup>1</sup>. However, adequate evidence is available on the prevalence and risk factors of falls in LMIC to justify a recommendation for opportunistic screening during encounters with the client by relevant agencies providing health and social care (such as, primary health care physicians, community health workers, volunteers) for older adults in LMICs.</i></p>		
<b>Intervention:</b>	Opportunistic screening for fall risk			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Community dwelling			
<b>Perspective:</b>	Community dwelling individuals			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	<ol style="list-style-type: none"> <li>1. We recommend that in LIMCs community dwelling individuals aged 60 years and over to be screened opportunistically for fall risk during any clinical encounter at least once a year by enquiring about the presence of falls in the past 12 months.</li> <li>2. While we recognize that this is relevant for global practice, this is particularly important in LMIC, as it has yet to be incorporated in healthcare policy. Screening measures need to be brief and simple, taking into account variable levels of training and expertise as well as time constraints.</li> </ol>	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● Probably no important uncertainty of variability</li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Number of fallers	Critical	⊕⊕⊕○ MODERATE	
			Number of falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<i>Summary of findings (GRADE):</i>			
			<b>№ of patients</b>		
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>
		Number of fallers (exercise)	968	954	OR: 0.43 (0.34-0.53)
		Number of falls (exercise)	262	220	OR: 0.35 (0.21-0.57)
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Number of fallers injured (exercise)	464	504	OR: 0.50 (0.35-0.71)
		Number of fallers (exercise using tai chi)	189	189	OR: 0.46 (0.30-0.70)
		Number of falls (exercise using tai chi)	113	129	OR: 0.24 (0.13-0.47)
		Number of fallers (multidomain interventions)	120	118	OR: 0.57 (0.23-1.44)

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	Recommendation 1: Local context needs to be considered when implementing fall prevention programmes in low- and middle-income countries. GRADE 1B				
Justification	Opportunistic screening conducted during encounters between older persons and relevant health and social care providers is widely recommended by existing guidelines. The older person may not necessarily present to health services after a fall in LMIC and may prefer to visit the traditional healer [5]. Conversely, some may attend emergency services to address their injuries, but the occurrence of a fall may not be recorded. In those with falls with minor or no injuries which may be recurrent or unexplained, the older person may not seek medical attention. Further, the older person may trivialize the fall, forget the fall or choose to conceal the information due to fear of loss of independent. Detection of the above cases is, therefore, only possible through direct enquiry performed during any encounter with health or social care services. The specific mention of case detection in LMICs should hopefully help support existing falls practitioners within LMICs gain traction towards highlighting this important issue in older populations in LMICs, which now outnumber that of higher income countries, where most published studies have been conducted. Policymakers should no longer deny the need for identification of older adults at risk of falls in LMICs considering a large body of published evidence from LMICs is now in existence [6].				
Subgroup considerations	Increased frequency of screening may be justified in women, persons living with disability, lower income groups and in older persons living alone [7-16].				
Implementation considerations	Awareness is of primary concern within LMIC settings. Opportunistic screening in healthcare settings therefore need to utilize simple mechanisms, hence singling out individuals aged 60 years and over to be asked the single question, “have you fallen in the past 12 months” is potentially the most viable strategy. All agencies involved in health and social care provision to older adults should receive mandatory falls prevention education and consider incorporating falls screening in their processes which should also including screening for other commonly under detected age-related issues such as hearing, vision and cognitive problems. The decision who should screen should consider resource availability and hence should not be limited to trained healthcare worker. However, the implementation of opportunistic screening needs to be linked to available services downstream to address those at high risk of falls. The algorithm for subsequent actions for when the older person with a history of falls is identified will need to be tailored to locally available resources and appropriate patient education.				

Monitoring and evaluation	The proportion of clients or patients aged 60 years and over utilizing the services provided by the health or social care provider who have been asked whether they have had a fall in the previous year could be used as a monitoring and evaluation tool.
Research Priorities	Intervention studies to determine the value of opportunistic screening and effective implementation strategies for opportunistic screening in various care settings should be considered.

## Recommendations for Working Group 9: Falls in Low- and Middle-Income Countries

**Recommendation 2 (Assessment): We conditionally recommend prioritising assessments of risk factors for cognitive impairment, obesity including sarcopenic obesity, diabetes, lack of appropriate footwear and environmental hazards as falls risk factors in low- and middle-income countries. GRADE 2C.**

<b>Population:</b>	Older adults aged $\geq 60$ years	<b>Objective:</b>		
<b>Intervention:</b>	Evaluation of nutritional status (including obesity), diabetes, cognition and footwear	1. We recommend addressing nutritional risk factors for falls (including deficiencies), obesity (including adiposity, excess body fat and sarcopenic obesity) and diabetes as important risk factors for older adults residing in LMICs.		
<b>Comparison:</b>	N/A	2. We also recommend critical attention to cognitive risk factors for falls in older adults within LMICs, as with lower educational attainment within older adults in developing countries the number of persons living with dementia in these settings are expected to increase exponentially alongside rapid population ageing.		
<b>Main outcomes:</b>	Obesity, Malnutrition, diabetes, inappropriate or absence of footwear	3. And finally, we recommend addressing poor footwear including bare footedness in older adults at risk of falls residing in LMICs as the lack of appropriate footwear is far more common in resource poor settings.		
<b>Setting:</b>	LMIC			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>	While available published evidence linking body composition, diabetes cognition and foot coverings with falls in LMICs remains limited, emerging evidence from LMICs have been consistent in suggesting that diabetes and obesity are associated with falls. Several published studies have address cognitive impairment, but with lower educational attainment considered the strongest risk factor for cognitive impairment and dementia, cognition likely to be an important and prominent risk factor for falls which should not be ignored. There is, also, weak evidence on increased risk of falls with inappropriate footwear which includes absence of shoes.	While footwear and cognition are also important in the developed world, cognition issues are greater with near absence of dementia diagnosis and lower education attainment being universal issues. Footwear issues also differ, as while heels are probably the main issue in developed countries, in developing countries its total absence of footwear, or inappropriate footwear such as flip-flops, broken or wrong sizes that are the issues.



<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>• <b>Important uncertainty or variability</b> <ul style="list-style-type: none"> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul> </li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Obesity	High	⊕⊕○○ MODERATE	
			Nutritional Status	Moderate	⊕○○○ LOW	
			Diabetes	Moderate	⊕⊕○○ MODERATE	
			Footwear	Moderate	⊕○○○ LOW	
			Cognition	High	⊕○○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
	What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>• <b>Low</b></li> <li>○ Moderate</li> <li>○ High</li> </ul>				

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>			Please provide supporting information	
		<b>Outcome</b>	<b>N<sup>o</sup> of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>● <b>Varies</b></li> <li>○ Don't know</li> </ul>					
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li>• <b>Uncertain</b></li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li><input type="radio"/> No studies</li> <li><input type="radio"/> Very low</li> <li>• <b>Low</b></li> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> High</li> </ul>	Please provide supporting information
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li><input type="radio"/> Favours the option</li> <li><input type="radio"/> Probably favours the option</li> <li><input type="radio"/> Does not favour either</li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li>• <b>Varies</b></li> </ul>	Please provide supporting information	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input checked="" type="radio"/> <b>Probably increased</b></li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	

**Should assessment of nutritional status, diabetes, cognition and footwear be recommended for older adults in LMIC to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	<b>Weak recommendation for the intervention</b> <input checked="" type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation	Recommendation 2: We conditionally recommend prioritising assessments of risk factors for cognitive impairment, obesity including sarcopenic obesity, diabetes, lack of appropriate footwear and environmental hazards as falls risk factors in low- and middle-income countries. GRADE 2C.				
Justification	While numerous risk factors for falls found in available epidemiological studies from LMICs have been found to mirror that previously established in higher income nations where most of the available evidence on falls risk factors have been studied, emerging evidence have, however, found unique, culturally-specific risk factors for LMIC. The obesity epidemic is has now moved to many middle-income countries which have outpaced and outperformed higher income nations in obesity rates. While the relationship between obesity and falls in higher income countries have been contentious, the evidence linking obesity and falls in LMIC is sparse but far more consistent. It is likely that sarcopenic obesity is far more common in LMIC. Similarly, cognitive impairment is associated with lower educational attainment, and older residents in LMICs are likely to have lower educational attainment. Those in LMICs are also less likely to have access to safe and appropriate footwear with bare footedness, mostly indoors but sometimes outdoors, commonplace in countries with tropical climates.				
Subgroup considerations	Falls in dementia populations in LMICs will require further evaluation, but it is expected that a sizeable proportion of those presenting with falls could have previously undiagnosed dementia. Body size and obesity prevalence is geographically specific with Western Pacific and Middle Eastern nations reporting far higher prevalence of obesity. Population specific nutritional and lifestyle interventions could be considered in these settings, which could have important implications on fall prevention in these settings. While footwear and cognition are also important in the developed world, cognition issues are greater with near absence of dementia diagnosis and lower education attainment being universal issues. Footwear issues also differ, as while heels are probably the main issue in developed countries, in developing countries its total absence of footwear, or inappropriate footwear such as flip-flops, broken or wrong sizes that are the issues. Further, walking barefoot and use of flip-flops are issues specific to countries with tropical climates, therefore, the development of strategies to educate as well as ensure availability of safe, affordable footwear would be specific to LMICs with warmer climates.				
Implementation considerations	Within LMICs, resources would be limited to ensure availability of nutrient rich food with lower caloric value, safe and appropriate footwear, exercise and educational programs and appropriately trained personnel to screen for and manage those with cognitive decline. Low-cost innovations are therefore required to ensure that these neglected areas in falls prevention are appropriately addressed.				

Monitoring and evaluation	The proportion of individuals with falls who also had nutritional status, obesity markers (BMI, waist circumference), diabetes cognitive assessment and footwear evaluation. Individuals living with obesity and cognitive impairment should also be screened for falls occurrence.
Research Priorities	Research into falls in individuals living with obesity, diabetes, and cognitive impairment in LMIC should be prioritized. With both conditions likely to become increasing prominent alongside rapid population ageing in LMICs. As footwear issues are unique within LMICs, with clear geographical variation, footwear research should also be prioritized.

## Recommendations for Working Group 9 - Falls in Low- and Middle-Income Countries

**Recommendation 3 (Assessment): We conditionally recommend that clinicians and caregivers in low- and middle-income countries settings should preferably use validated tools that are freely available in their country of residence to assess mobility and fall risk. GRADE: E.**

<b>Population:</b>	Individuals aged 60 years and over in LMIC with at least one fall in the past 12 years	<b>Objective:</b> <i>Falls are commonly the result of interacting risks, and one leading risk factor is gait and balance impairment. Gait and balance assessment has been recommended in older people with risk of falls.</i>		
<b>Intervention:</b>	Gait and balance assessment	<i>The objective was to review the literature regarding the best physical assessment tool for gait and balance impairment among older adults, performed as part of a multifactorial falls risk assessment for falls in LMICs.</i>		
<b>Comparison:</b>	N/A			
<b>Main outcomes:</b>	Impaired Gait and Balance			
<b>Setting:</b>	LMIC			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>	<p>Earlier studies showed there is no robust single physical assessment tool that can be used to perform a perfect risk assessment for gait and balance in relation to falls risk. Moreover, muscle strength appeared as a stronger risk factor and predictor compared to balance in younger older persons in LMI. In a recent review, gait speed was found to be a sensitive tool in the higher-income countries—and given its low cost and ease of administration—it may be a useful tool to implement in LMIC.</p>	<p>Tools validated in developed nations such as gait speed may not work in low- and middle-income countries. Cramped, over-crowded conditions with lack of level ground may be a major barrier.</p>

Benefits and harms (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>• <b>Important uncertainty or variability</b> <ul style="list-style-type: none"> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty of variability</li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul> </li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Gait impairment	high	⊕⊕⊕○ MODERATE	
			Balance impairment	high	⊕⊕⊕○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>• <b>Moderate</b></li> <li>○ High</li> </ul>					



How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>• <b>Large</b></li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>			Please provide supporting information	
		<b>Outcome</b>	<b>N<sub>o</sub> of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>• <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>					
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>• <b>Favours the option</b></li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>					

<b>Values and preferences</b>	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	
	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li><input type="radio"/> No studies</li> <li><input type="radio"/> Very low</li> <li><input type="radio"/> Low</li> <li><input checked="" type="radio"/> <b>Moderate</b></li> <li><input type="radio"/> High</li> </ul>	Please provide supporting information	
<b>Resources</b>	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li><input type="radio"/> Favours the option</li> <li><input checked="" type="radio"/> <b>Probably favours the option</b></li> <li><input type="radio"/> Does not favour either</li> <li><input type="radio"/> Probably favours the comparison</li> <li><input type="radio"/> Favours the comparison</li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input checked="" type="radio"/> <b>Probably increased</b></li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>	Please provide supporting information	
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	<b>Weak recommendation for the intervention</b> <input checked="" type="radio"/>	Strong recommendation for the intervention <input type="radio"/>
Recommendation	Recommendation 3: We conditionally recommend that clinicians and caregivers in low- and middle-income countries settings should preferably use validated tools that are freely available in their country of residence to assess mobility and fall risk. GRADE: E				
Justification	Whilst there is lack of firm evidence for the best single physical assessment tool to be used for assessment of gait and balance impairment among older adults with risk of falls in LMIC, timed up and go test (TUG), gait speed or muscle strength test (hand grip or sit to stand tests) may be used with reference to the normative data or cut off points established for the population if available.				
Subgroup considerations	This recommendation is valid for all settings within LMICs: community, hospital, and long-term care.				
Implementation considerations	These physical assessment tools may be used as an initial screening tool for falls risk in older adults. Further assessment should be performed using other comprehensive tools to identify specific impairment for personalised intervention.				
Monitoring and evaluation	A routine assessment of gait and balance performance should be a part of a holistic multifactorial fall risk assessment in older people deemed to be at high risk of falls, at least biannually as a minimum interval.				
Research Priorities	Further studies on the validity of physical assessment tool as a falls risk assessment for gait and balance impairment in older adults is required in LMICs.				

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## Working Group 10: Multifactorial falls Risk Assessment and Interventions for Preventing Falls in Community-Dwelling Older Adults

### Recommendations for Working Group 10: Multifactorial falls Risk Assessment and Interventions for Preventing Falls in Community-Dwelling Older Adults

**Recommendation 1 (Assessment):** We recommend multiprofessional, multifactorial falls risk assessment to community-dwelling older adults identified to be at high risk of falling, to guide tailored interventions. **GRADE: 1B**

**Recommendation 2 (Interventions):** We recommend offering multidomain interventions, informed by a multiprofessional, multifactorial falls risk assessment to community-dwelling older adults identified to be at high risk of falling. **GRADE: 1B**

<b>Population:</b>	Older adults aged $\geq 65$	<i>Objective: Given its multifactorial nature, it is assumed that comprehensive geriatric assessment (CGA) leading to individually targeted interventions would be effective. Previous literature has shown that several good quality trials have resulted in a reduction in falls [1,2]. Our objective was to update the literature to assess if multidomain interventions (i.e. interventions with two or more components, individually targeted) reduce the rate of falls and risk of falling in community-dwelling older adults.</i>		
<b>Intervention:</b>	Multidomain intervention			
<b>Comparison:</b>	Standard care			
<b>Main outcomes:</b>	Falls, Concerns about falling			
<b>Setting:</b>	Community-dwelling older adults			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>		



<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Concerns about falling	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>			* Dautzenberg et al., 2021	
		<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
			<b>Intervention</b>	<b>Control</b>		<b>Relative / Absolute (95% CI)</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Fall rate*	Multifactorial		RR: 0.87 (0.80 – 0.95)	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Number of fallers*	Multifactorial		RR: 0.95 (0.89 – 1.01)	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	No mention of costs associated with the intervention.
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	No mention of the interventions impact on health equity.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		
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**Should multidomain interventions offered to community-dwelling older adults identified to be at moderate or high risk of falling, to reduce the rate of falls and risk of falling be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	<p>Recommendation 1: We recommend multiprofessional, multifactorial falls risk assessment to community-dwelling older adults identified to be at high risk of falling, to guide tailored interventions. GRADE: 1B</p> <p>Recommendation 2: We recommend offering multidomain interventions, informed by a multiprofessional, multifactorial falls risk assessment to community-dwelling older adults identified to be at high risk of falling. GRADE: 1B</p>				
Justification	<p>We based our recommendation on above summarized recent systematic review and network meta-analyses on interventions for preventing falls in community dwelling older adults, which was published in 2021 [3], two Cochrane systematic reviews assessing multidomain interventions for prevention of falls in older people living in the community [1,2] and two WHO summary reports on falls prevention in community dwelling older persons [6,7]. The 2021 comprehensive systematic review and network meta-analysis consisted of 192 studies (randomized trials and quasiexperimental trials) enrolling community-dwelling participants <math>\geq 65</math> years old. Studies enrolling specific patient populations (e.g., those with a stroke or Parkinson disease) were excluded. Its literature search was completed on February 27, 2019, thus post-hoc analyses were conducted including two large, randomized trials of multidomain interventions for preventing falls that were published in 2020 [4, 5]. These post-hoc analyses did not substantively alter network meta-analysis results or our recommendations. Review authors rated their certainty in the evidence using the CINeMA tool, which assesses the confidence in network meta-analysis results as per six domains: within-study bias, reporting bias, indirectness, imprecision, heterogeneity, and incoherence [8].</p>				
Subgroup considerations	<p>This recommendation is targeted to community-dwelling older adults. Multidomain interventions in other settings (hospital and nursing homes) are addressed in separate recommendations (working group 5).</p>				
Implementation considerations	<p>Two recent pragmatic trials [4,5] illustrated that within current health care systems (UK and US) it is difficult to successfully implement interventions proven to be effective in previous smaller research trial settings [1,9]. For successful and durable implementation of falls prevention interventions, collaboration between relevant medical disciplines, health care insurers and governmental bodies is deemed to be essential. Effective policies require engagement with appropriate stakeholders, which should include decision- and policymakers, healthcare funders, health care professionals, and older peoples' associations and advocates [6].</p>				

Monitoring and evaluation	Monitoring and evaluation of uptake of the intervention is warranted as it is the key to effectiveness. The intervention might need further adaptation upon follow-up, individualized according to the risk profile and goals and wishes of the older person.
Research Priorities	Further research is needed to assess how best to implement multifactorial strategies most cost-effectively. It is likely that the enhanced services would cost more to the prevention service provider but less to the health and social care system if sufficient falls, fractures, and other injuries are prevented thereby reducing hospital admissions and ongoing need for social care. Also, different risk groups may benefit from different interventions. Finally, studies in different settings, including low- and middle-income countries are warranted.

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## Working Group 11: Older Adults' Perspectives on Falls

### Recommendations for Working Group 11: Older Adults' Perspectives on Falls

**Recommendation 1 (Stratification):** We recommend clinicians should routinely ask about falls in their interactions with older adults. **GRADE: 1A**

**Recommendation 2 (Assessment):** As part of a multifactorial falls risk assessment, clinicians should enquire about the perceptions the older adult holds about falls, their causes, future risk, and how they can be prevented. **GRADE: 1B.**

**Recommendation 3 (Interventions):** A care plan developed to prevent falls and related injuries should incorporate the values and preferences of the older adult. **GRADE: 1B.**

<b>Population:</b>	Older adults aged $\geq 60$	<i>Objective: Up to a third of community-dwelling older people fall annually.<sup>2</sup> They are the leading cause of fatal and non-fatal injuries in this age group<sup>2</sup> and can also precipitate functional decline, loss of independence, and psychological distress.<sup>3</sup> Given the high prevalence of falls among older people and their potential adverse impacts on both personal health and healthcare utilization, various interventions have been designed to prevent falls or minimize the risk of injury from them.<sup>3,4</sup> Their uptake will be influenced by how serious older people view falls and their belief that they are preventable.<sup>5</sup></i>		
<b>Intervention:</b>	1 & 2: Ask for the occurrence and perception of falls during fall's assessment 3: Developed care plan incorporating patient preferences			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Falls			
<b>Setting:</b>	Community-dwelling older adults			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
Priority of the Problem	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>● <b>Possibly important uncertainty or variability</b></li> <li>○ Probably no important uncertainty of variability</li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<i>Relative importance of the main outcomes of interest:</i>			
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			Concerns about falling	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					



How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>● <b>Moderate</b></li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE):</b>			* Becker C, Kron M, Lindemann U, et al. Effectiveness of a multifaceted intervention on falls in nursing home residents. J Am Geriatr Soc. 2003;51(3):306-313. doi:10.1046/j.1532-5415.2003.51103.x	
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	<b>Intervention</b>	<b>Control</b>	<b>Relative / Absolute (95% CI)</b>		
		Falls*	547	980		RR = 0.55 (0.41 – 0.73)
		Number of fallers*	188	247	RR = 0.75 (0.57 – 0.98)	
		Fall Frequency*	66	115	RR = 0.56 (0.35 – 0.89)	

<b>Values and preferences</b>	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>	<ul style="list-style-type: none"> <li>● A significant proportion of older people viewed falls and related injuries as something either intrinsically tied to aging or arising from chance – in other words, inevitable.<sup>11,12,20,23,30,33,41</sup></li> <li>● No mentioned burden of the intervention</li> </ul>	
<b>Resources</b>	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	N/A No mention of any costs associated to these recommendations	
<b>Resources</b>	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>● <b>Does not favour either</b></li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	N/A No mention of any costs associated to these recommendations	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>		
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>	Recommendations primarily involve questionnaires, patient perceptions and preferences. All of which are feasible to implement.	
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**Should \_\_\_ be recommended for older adults to prevent and manage falls?**

Type of recommendation	Strong recommendation against the intervention <input type="radio"/>	Weak recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Weak recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
Recommendation	<p>Recommendation 1: We recommend clinicians should routinely ask about falls in their interactions with older adults. GRADE: 1A</p> <p>Recommendation 2: As part of a multifactorial falls risk assessment, clinicians should enquire about the perceptions the older adult holds about falls, their causes, future risk, and how they can be prevented. GRADE: 1B.</p> <p>Recommendation 3: A care plan developed to prevent falls and related injuries should incorporate the values and preferences of the older adult. GRADE: 1B.</p>				
Justification	<p>We conducted a scoping review<sup>8,9</sup> (specific methodology used available upon request) of the peer-reviewed literature on the perceptions older community-dwelling people hold about falls in order to: (a) identify which aspects of the topic have been studied (including both where and how); (b) describe the range of perceptions older people have about falls and their risk of falling; (c) determine, where possible, which socio-demographic factors and other personal characteristics influence these perceptions; and, (d) identify areas requiring further study.</p>				
Subgroup considerations	None				
Implementation considerations	None				
Monitoring and evaluation	None				
Research Priorities	<ol style="list-style-type: none"> <li>1. Further research on the associations between perceptions about falls and socio-demographic characteristics. Work done to date indicates, for example, significant relationships between gender<sup>13,15,27,35,38,49,55,57,62</sup> and FOF.</li> <li>2. More research is needed to understand the stability and evolution of these perceptions over time, their relationships with fall outcomes, and whether they can be modified (and by what means).</li> </ol>				

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|  | <ol style="list-style-type: none"> <li>3. Research should extend to parts of the world where few studies been done to date (e.g., Africa, South America).</li> <li>4. Greater involvement of older people often excluded from the research done to date (e.g., those significant cognitive impairment).</li> <li>5. Systematic review of how the values and preferences of older people affect the choice and outcomes of fall prevention interventions (on-going).<sup>10</sup></li> <li>6. Further research on the roles and experiences of formal (paid) and informal (unpaid) caregivers of older people in fall prevention. An integrative review of 15 studies highlighted the complexity and importance of this issue.<sup>66</sup></li> </ol> |
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## Working Group 12: Concerns about Falling and Falls

### Recommendations for Working Group 12: Concerns about Falling and Falls

**Recommendation 1 (Assessment).** We recommend including an evaluation of concerns about falling in a multifactorial falls risk assessment of older adults. **GRADE: 1B**

**Recommendation 2 (Assessment).** We recommend using a standardised instrument to evaluate concerns about falling such as the Falls Efficacy Scale International (FES-I) or Short FES-I in community-dwelling older adults. **GRADE: 1A**

**Recommendation 3 (Assessment).** We recommend using the FES-I or especially the Short FES-I for assessing concerns about falling in acute care hospitals or long-term care facilities. **GRADE: 1B**

<b>Population:</b>	Older adults	<i>Objective: Step 1: To make evidence-based recommendations through critical appraisal of the existing evidence (systematic review and meta-analysis) on assessments of Concerns about falling as part of a multifactorial falls risk assessment of older people.</i>		
<b>Intervention:</b>	FES-I & Short FES-I			
<b>Comparison:</b>	Consistency			
<b>Main outcomes:</b>	Concerns about falling			
<b>Setting:</b>	Community-dwelling older adults (1A), acute care hospitals (1B), long-term care facilities (1B)			
<b>Perspective:</b>	Population			
<b>Decision Domain</b>		<b>Judgements</b>	<b>Research Evidence</b>	<b>Additional Considerations /Explanations</b>
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	



<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Concerns about falling	Critical	⊕⊕⊕○ MODERATE	
			Falls	Critical	⊕⊕⊕○ MODERATE	
			FES-I	Critical	⊕⊕⊕○ MODERATE	
			Short FES-I	Critical	⊕⊕⊕○ MODERATE	
			Icon FES	Important but not critical	⊕⊕⊕○ MODERATE	
			Short Icon FES	Important but not critical	⊕⊕○○ LOW	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					

How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>○ Trivial</li> <li>○ Varies</li> <li>● <b>Not applicable</b></li> </ul>	<b>Summary of findings (GRADE): 1A, 1B</b>			*Test-retest **Inter-rater Reliability ***Only 1 study  McGarrigle L, Yang Y, Lasrado R, et al. A systematic review and meta-analysis of the psychometric properties of four variants of the Falls Efficacy Scale-International (FES-I). <i>Paper in preparation 2022</i>	
		<b>Outcome</b>	<b>Nº of patients</b>			<b>Effect</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>● <b>Not applicable</b></li> </ul>	FES-I*	1169	N/A	Pooled ICC: 0.94 (0.91 – 0.96)	It is reliable to assess concerns about falling or falls efficacy, however not directly related to fall risk.
		Short FES-I*	154	N/A	Pooled ICC: 0.90 (0.87 – 0.94)	
		Icon FES*	150	N/A	Pooled ICC: 0.90 (0.83 – 0.94)	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> <li>● <b>Not applicable</b></li> </ul>	Short Icon FES*	201	N/A	Pooled ICC: 0.93 (0.90 – 0.95) & 0.92 (0.89 – 0.95)	
		FES-I**	402	N/A	Pooled ICC: 0.93 (0.88 – 0.98)	
		Short FES-I**	31	N/A	ICC***: 0.93 (0.86 – 0.96)	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Uncertain</b></li> <li>○ Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> </ul>	Recommendation is not an intervention.	
	Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	Recommendation is not an intervention.
Does the cost effectiveness favour the intervention or the comparison?		<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Recommendation is not an intervention.	

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	N/A	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> <b>Yes</b></li> <li><input type="radio"/> Varies</li> </ul>		

Feasibility	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● Yes</li> <li>○ Varies</li> </ul>	Recommendation is not an intervention.	
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**Should the FES-I or short FES-I be recommended for assessing concerns about falling in all settings?**

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ○	Strong recommendation for the intervention ●
Recommendation	<p>Recommendation 1: We recommend including an evaluation of concern about falling in a multifactorial falls risk assessment of older adults. GRADE: 1B</p> <p>Recommendation 2: We recommend using a standardised instrument to evaluate concerns about falling such as the Falls Efficacy Scale International (FES-I) or Short FES-I in community-dwelling older adults. GRADE: 1A</p> <p>Recommendation 3: We recommend using the FES-I or especially the Short FES-I for assessing concerns about falling in acute care hospitals or long-term care facilities. GRADE: 1B</p>				
Justification	<p>Evidence for our recommendations on the best tool to evaluate concerns about falling and best interventions to address concerns about falling have emerged from a range of systematic reviews and meta-analyses. There is at best moderate evidence that concerns about falling tools is predictive of future falls, which is not supported by systematic review evidence. Our expert opinion is that concerns about falling is unlikely to be the primary cause of falls in older people, and that the relationship between concerns about falling tools and future falls is likely dependent on a person's physiological fall risk.</p>				
Subgroup considerations	<p>FES-I and Short FES-I are important measures in the multifactorial falls risk assessment of community-dwelling older people who have fallen and/or are at risk for falling for the purposes of developing risk profiles and informing management. FES-I and Short FES-I have also been validated in people with mild to moderate cognitive impairment and early stage dementia, as well as other conditions associated with an increased risk of falls (e.g. Stroke, MS, and Parkinson's disease). Nonetheless, further research will strengthen our understanding.</p>				
Implementation considerations	<p>FES-I is a suitable test that can easily be implemented in the standard clinical evaluation of older people, due to its ease and efficiency of administration, low cost, and reliability.</p>				
Monitoring and evaluation	<p>For monitoring the effectiveness of interventions to reduce concerns about falling, it is important to use validated scales. A recent systematic review on the measurement properties of the FES-I found sufficient evidence for the responsiveness of the FES-I. The majority of effect sizes reported across five studies supported pre-defined hypotheses regarding the expected magnitude of change, suggesting its usefulness as a monitoring and evaluation tool. There is inconsistent evidence regarding the responsiveness of the Short FES-I.</p>				

Research Priorities	<p>1. Preferred concerns about falling assessment tools need to be defined for different settings (e.g., community, outpatient clinic, acute care, long term care), older people with specific clinical characteristics (e.g., cognitive impairment, stroke, Parkinson’s disease) and different levels of functional status. A review of FES-I measurement characteristics in sub-populations would be a timely first step. 2. Meaningful cut-off points for FES-I need to be confirmed across larger samples of community dwelling older people and need to be established for older people with specific clinical characteristics (e.g., cognitive impairment, stroke, Parkinson’s disease) and different levels of functional status. 3. Further research is also recommended to establish the minimally important and clinically meaningful change of the FES-I. 4. The predictive ability of concerns about falling for falls, injurious falls, and restriction of daily activities need to be confirmed, as well as the mediating effect of related constructs (e.g., anxiety, depression, social isolation, self-efficacy) in these relationships.</p>
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## Recommendations for Working Group 12: Concerns about falling

**Recommendation 4 (Assessment). We recommend exercise, cognitive behavioural therapy and/or occupational therapy (as part of a multidisciplinary approach) to reduce concerns about falling in community-dwelling older adults. GRADE: 1B**

<b>Population:</b>	Older adults	<i>Objective: Step 2: To make evidence-based recommendations through critical appraisal of the existing evidence (systematic review and meta-analysis) on intervention for concerns about falling as part of a multidisciplinary approach.</i>		
<b>Intervention:</b>	Multidisciplinary approach to reduce concerns about falling			
<b>Comparison:</b>	Usual care			
<b>Main outcomes:</b>	Concerns about falling, falls			
<b>Setting:</b>	Community-dwelling older adults			
<b>Perspective:</b>	Population			
Decision Domain		Judgements	Research Evidence	Additional Considerations /Explanations
<b>Priority of the Problem</b>	Is the problem a priority?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>○ Probably yes</li> <li>● <b>Yes</b></li> <li>○ Varies</li> </ul>	See 'Overview of the Problem' above.	

<b>Benefits and harms</b> (see below)	Is there important uncertainty or variability in how much patients, researchers, clinicians and stake holders value the main outcomes?	<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● <b>Probably no important uncertainty of variability</b></li> <li>○ No important uncertainty of variability</li> <li>○ No known undesirable</li> </ul>	<b>Relative importance of the main outcomes of interest:</b>			None.
			<b>Outcome</b>	<b>Relative Importance</b>	<b>Certainty of the evidence (GRADE)</b>	
			Concerns about falling	Important	⊕⊕⊕○ MODERATE	
			Falls	Critical	⊕⊕⊕○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
					○○○○ MODERATE	
What is the overall certainty of this evidence?	<ul style="list-style-type: none"> <li>○ No studies</li> <li>○ Very low</li> <li>○ Low</li> <li>● <b>Moderate</b></li> <li>○ High</li> </ul>					



How substantial are the desirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>● <b>Small</b></li> <li>○ Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<b>Summary of findings (GRADE): 1B</b>			Physical intervention was more greatly associated with a reduction in concerns about falling, whereas written interventions or tailoring were largely ineffective.	
		<b>Outcome</b>	<b>N<sub>o</sub> of patients</b>			<b>Effect</b>
How substantial are the undesirable anticipated effects of the intervention?	<ul style="list-style-type: none"> <li>● <b>Trivial</b></li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Reduced concerns about falling (Holistic exercise) <sup>4</sup>			SMD = -0.823 (-1.255, -0.392)	<p>It is reliable for interventions can reduce concerns about falling and improve falls efficacy, however it is not directly associated to risk of falls.</p> <p>* Immediately postintervention  ** ≤ 6 months postintervention  *** &gt; 6 months postintervention</p>
		Reduced concerns about falling (cognitive behavioral therapy) <sup>5</sup>	1644	1521	SMD = -0.28 (-0.35, -0.21) * I <sup>2</sup> = 36%	
			701	659	SMD = -0.32 (-0.49, -0.15) ** I <sup>2</sup> = 50%	
			704	699	SMD = -0.30 (-0.45, -0.14) *** I <sup>2</sup> = 50%	
Does the balance between desirable effects and undesirable effects favour the option of the comparison?	<ul style="list-style-type: none"> <li>○ Favours the option</li> <li>● <b>Probably favours the option</b></li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>	Immediate effect on concerns about falling (cognitive behavioural therapy) <sup>6</sup>			SMD = 0.334 (0.206, 0.462) I <sup>2</sup> = 0%	
		Reduced concerns about falling (Occupational therapy) <sup>7</sup>			SMD = -0.17 (-0.29, -0.05) I <sup>2</sup> = 0%	

Values and preferences	Is there similarity about how much patients, researchers, clinicians and stake holders value the main Outcomes? Also include adverse effects and burden of the intervention	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
Resources	What is the certainty of the evidence of resources requirements (costs)?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> </ul>	No mention of associated cost for the intervention	
	Does the cost effectiveness favour the intervention or the comparison?	<ul style="list-style-type: none"> <li>● <b>No studies</b></li> <li>○ Favours the option</li> <li>○ Probably favours the option</li> <li>○ Does not favour either</li> <li>○ Probably favours the comparison</li> <li>○ Favours the comparison</li> <li>○ Varies</li> </ul>		

Equity	What would be the impact on health equity?	<ul style="list-style-type: none"> <li><input type="radio"/> Increased</li> <li><input type="radio"/> Probably increased</li> <li><input checked="" type="radio"/> <b>Uncertain</b></li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Varies</li> </ul>	No mention on the impacts this intervention has on health equity.	
Acceptability	Is the option acceptable to key stakeholders?	<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Uncertain</li> <li><input checked="" type="radio"/> <b>Probably yes</b></li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> </ul>		

<b>Feasibility</b>	Is the intervention feasible to implement?	<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Uncertain</li> <li>● <b>Probably yes</b></li> <li>○ Yes</li> <li>○ Varies</li> </ul>		
	<b>Should exercise, cognitive behavioral therapy and/or occupational therapy (as part of a multidisciplinary approach) to reduce concerns about falling in community-dwelling older people be recommended for older adults to prevent and manage falls?</b>			

Type of recommendation	Strong recommendation against the intervention ○	Weak recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Weak recommendation for the intervention ○	Strong recommendation for the intervention ●
Recommendation	Recommendation 4: We recommend exercise, cognitive behavioural therapy and/or occupational therapy (as part of a multidisciplinary approach) to reduce concerns about falling in community-dwelling older adults. GRADE: 1B				
Justification	Evidence for our recommendations on the best tool to evaluate concerns about falling and best interventions to address concerns about falling have emerged from a range of systematic reviews and meta-analyses. There is at best moderate evidence that concerns about falling tools is predictive of future falls, which is not supported by systematic review evidence. Our expert opinion is that concerns about falling is unlikely to be the primary cause of falls in older people, and that the relationship between concerns about falling tools and future falls is likely dependent on a person's physiological fall risk.				
Subgroup considerations	Concerns about falling should be managed where possible through a multidisciplinary fall prevention approach that includes exercise, cognitive behavioral therapy and/or occupational therapy interventions. Most studies have included exercise and were conducted in community settings. <sup>3 4</sup> There is insufficient evidence to provide insight whether a certain subgroup might be more or less likely to benefit from these interventions.				
Implementation considerations	Older people who present with concerns about falling should be offered an exercise program as a minimum, but ideally as part of a multidisciplinary approach that might also include cognitive behavioral therapy and/or occupational therapy interventions.				
Monitoring and evaluation	For monitoring the effectiveness of interventions to reduce concerns about falling, it is important to use validated scales. A recent systematic review on the measurement properties of the FES-I found sufficient evidence for the responsiveness of the FES-I. <sup>1</sup> The majority of effect sizes reported across eight studies supported pre-defined hypotheses regarding the expected magnitude of change, suggesting its usefulness as a monitoring and evaluation tool. There is inconsistent evidence regarding the responsiveness of the Short FES-I.				

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