



NSW  
Fall Prevention  
& Healthy Ageing  
Network

# RESEARCH UPDATE

A/Prof Daina Sturnieks



**UNSW**  
THE UNIVERSITY OF NEW SOUTH WALES







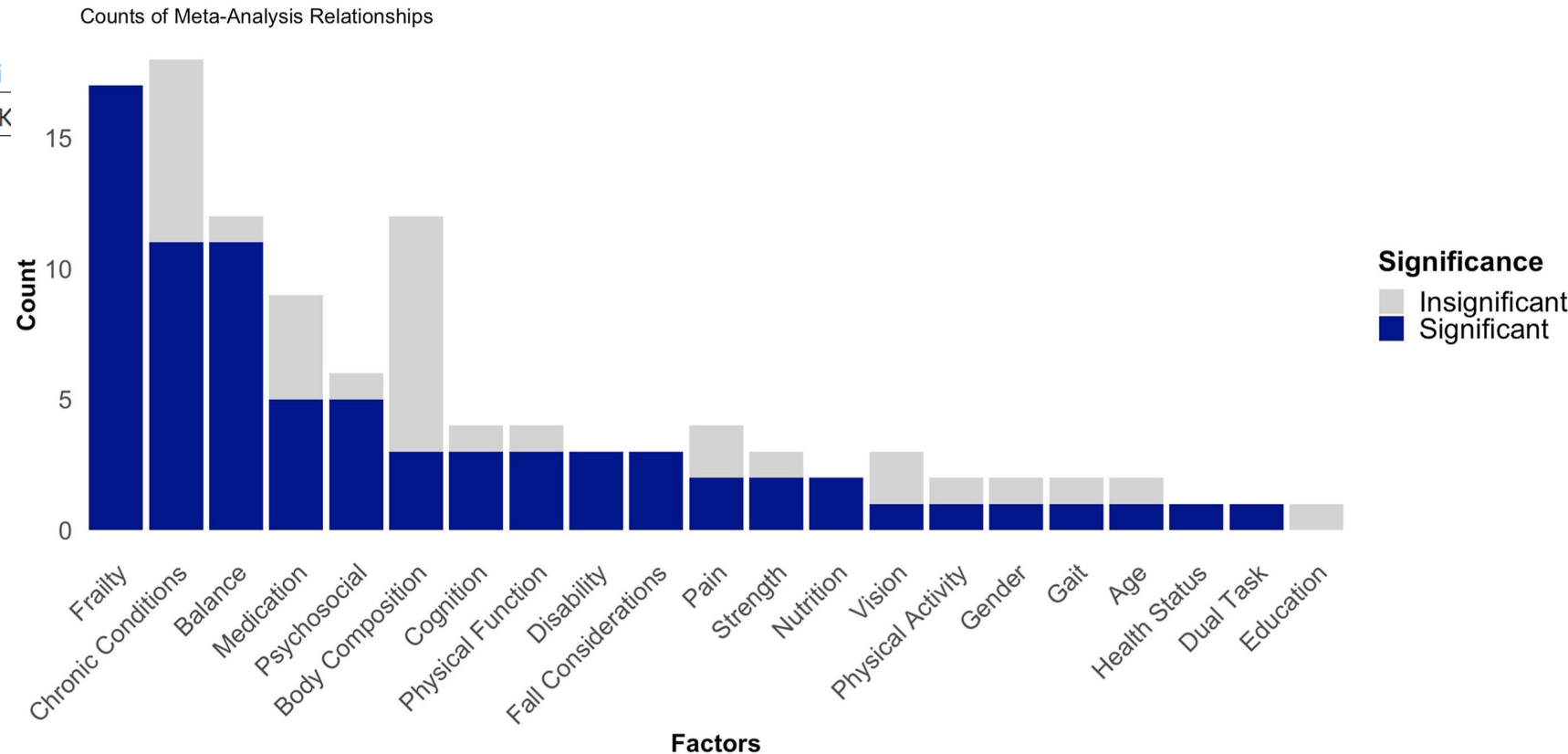
# UNDERSTANDING FALL RISK

Review Article

# Risk Factors for Falls in Community-Dwelling Older Adults: An Umbrella Review

Stephanie Saunders MScPT, Cassandra D'Amore PhD, Quikui Nabil Abd El-Moneim MScPT, Julie Richardson PhD, PT, Ayse K Beauchamp PhD, PT  



- 2004 - 2023
- 57 reviews
- Most high-income countries
- 29 risk factors





Featured Article

# Risk factors for falls in older people with pre-frailty: A systematic review and meta-analysis

Haiyan Jing <sup>a</sup>, Yulan Chen <sup>b</sup>  , Bijuan Liang <sup>b</sup>, Zhihe Tian <sup>b</sup>, Feng Song <sup>c</sup>, Mingzhi Chen <sup>a</sup>, Wenxuan Kong <sup>a</sup>, Yihan Duan <sup>a</sup>

- 26 studies
- Moderate-high quality
- 16 potential fall risk factors

Significant risk factors	Odds Ratio
<b>Peripheral neuropathy</b>	<b>3.18</b>
Decreased gait speed	1.90
Decreased ADL ability	1.57
Decreased grip strength	1.53
Female gender	1.51
Pain	1.47
Fall history	1.20
Age	1.10

Review Article

## Prevalence and Risk Factors for Falls in Older Adults With Diabetes: A Systematic Review and Meta-Analysis

Tuonan Liu MS<sup>a,b</sup>, Yue Lin MS<sup>a</sup>, Rui Qi MS<sup>c</sup>, Xuan Chen MS<sup>a</sup>, Yingjing Xiao MS<sup>d</sup>,  
Wenrong Xu BS<sup>e</sup>, Jie Yao MS<sup>b,\*</sup>, Yan Hua PhD<sup>a,\*</sup>

- 32 studies
- 23,666 participants
- 30% prevalence falls

Significant risk factors	Odds Ratio
<b>Hypoglycaemia</b>	<b>2.22</b>
<b>Depression</b>	<b>2.22</b>
<b>Diabetic peripheral neuropathy</b>	<b>2.15</b>
<b>Gait issues</b>	<b>2.01</b>
Balance problems	1.91
Walking aid use	1.90
Impaired cognitive function	1.77
Diabetic retinopathy	1.72
Visual function abnormalities	1.60
Weight loss	1.55
<b>Better sleep</b>	<b>0.55</b>
Female sex	1.35
Older age	-



# INTERVENTIONS TO PREVENT FALLS




Cochrane Database of Systematic reviews | [Review - Intervention](#)

## Interventions for preventing falls in older people in care facilities

✉ Suzanne M Dyer, Wing S Kwok, Jenni Suen, Rik Dawson, Dylan Kneale, Katy Sutcliffe, Lotta J Seppala, Keith D Hill, Ngaire Kerse, Geoffrey R Murray, Nathalie van der Velde, Catherine Sherrington, Ian D Cameron

Version published: 20 August 2025 [Version history](#)

<https://doi.org/10.1002/14651858.CD016064> 

- 104 studies
- 68,964 participants
- Average age 84 years
- 72% women

### Multifactorial interventions

- probably reduces the number of fallers, not rate of falls
- larger effects if put in place with facility staff and individualised

### Exercise

- probably reduces the number of fallers and rate of falls
- needs to be ongoing

### Medication optimisation (single intervention)

- little or no difference to number of fallers or rate of falls

### Vitamin D supplementation

- Probably reduces rate of falls

### Dairy foods (dietitian assistance with menu design)

- may decrease the risk of falling and fractures (1 trial)

# Interventions for preventing falls in older people in hospitals

Charlotte McLennan et al., 2026



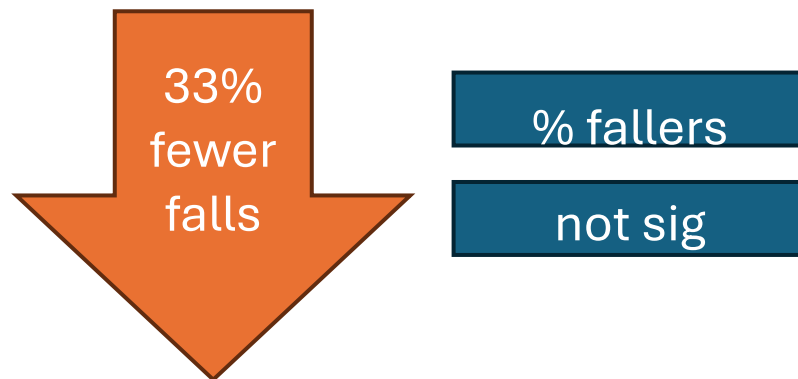
- 55 trials (32 new)
- 104,474 studies
- Average age 79 years
- 45% women
- Mostly low certainty evidence
- **Exercise:** may reduce risk of falling in subacute setting; little or no effect in acute setting.
- **Medication optimisation:** uncertain effects
- **Service model change:** (change in model of care or organisational system for fall reduction) probably reduces the rate of falls in acute settings
- **Education:** (patient, staff or multicomponent) probably reduces the rate and risk of falls, uncertain in those with cognitive impairment
- **Environment/assistive technology:** uncertain of the effect of low-low beds, no strong evidence for other approaches (e.g. alarms)
- **Multifactorial interventions:** (based on a fall risk-assessment) probably reduces the rate and risk of falls
- **Multiple interventions:** (care bundle, e.g. aids + social environment + medication review) may reduce risk of falls



# Home based, tailored intervention to reduce rate of falls after stroke (FAST): randomised trial

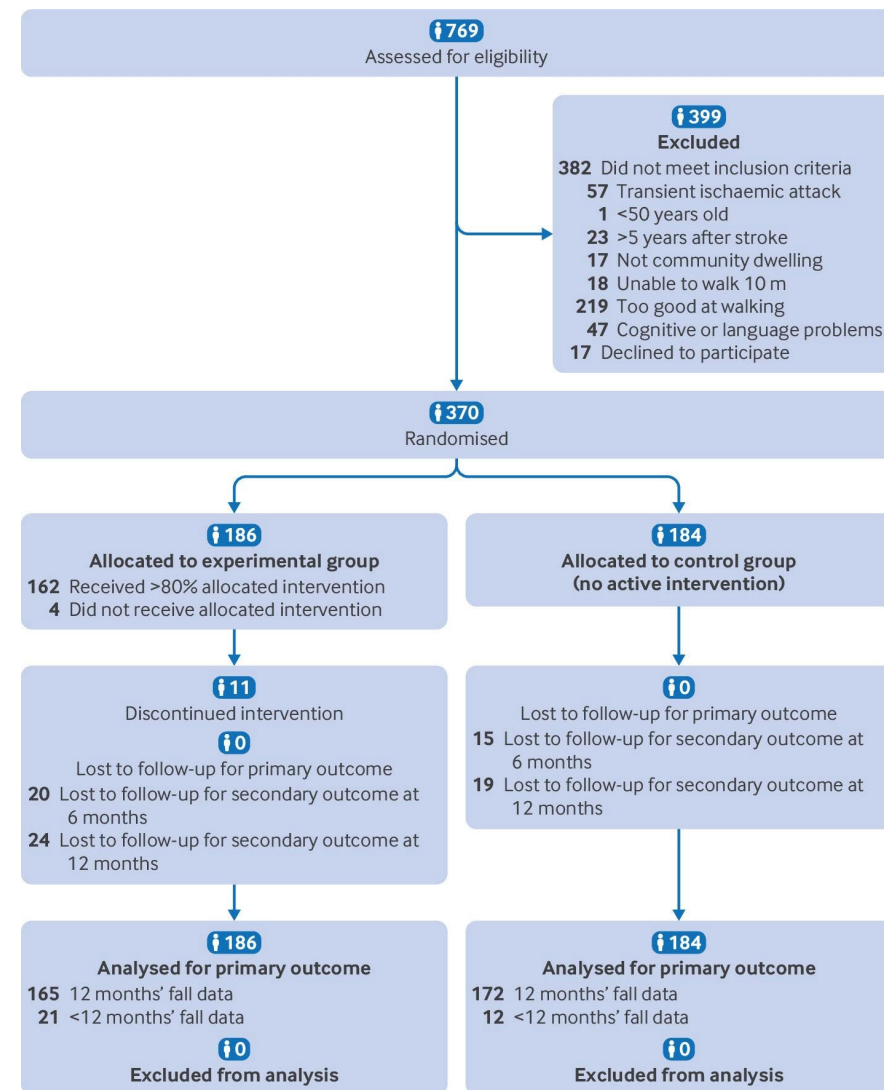
Lindy Clemson,<sup>1</sup> Katharine Scrivener,<sup>2</sup> Natasha Lannin,<sup>3,4</sup> Louise Ada,<sup>1</sup> Sally Day,<sup>1</sup> Ingrid Lin,<sup>2</sup> Stephen Isbel,<sup>5</sup> Anne Cusick,<sup>1</sup> Benjamin Gardner,<sup>6</sup> Elisabeth Preston,<sup>5</sup> Gillian Heller,<sup>7</sup> Catherine M Dean<sup>2</sup>; on behalf of the FAST Study Group

- 370 participants
- Within 5 years of stroke
- Aged >50 years
- Living in the community
- Able to walk 10 m



















Home based tailored intervention (OT+physio) for 6 months, incl.:

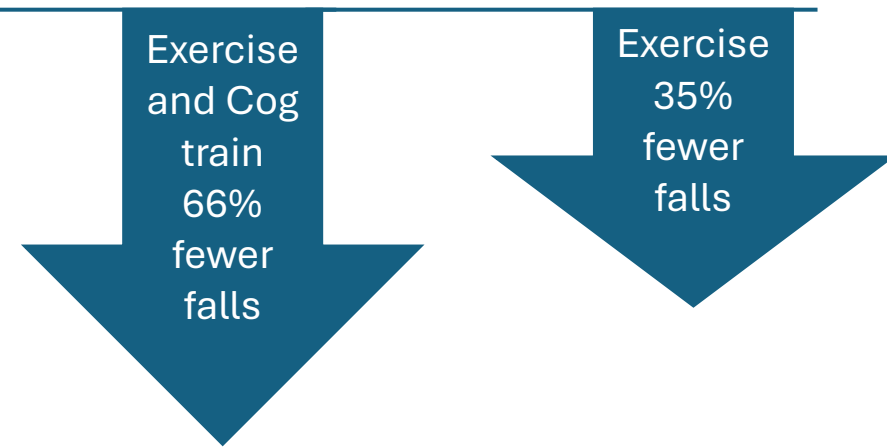
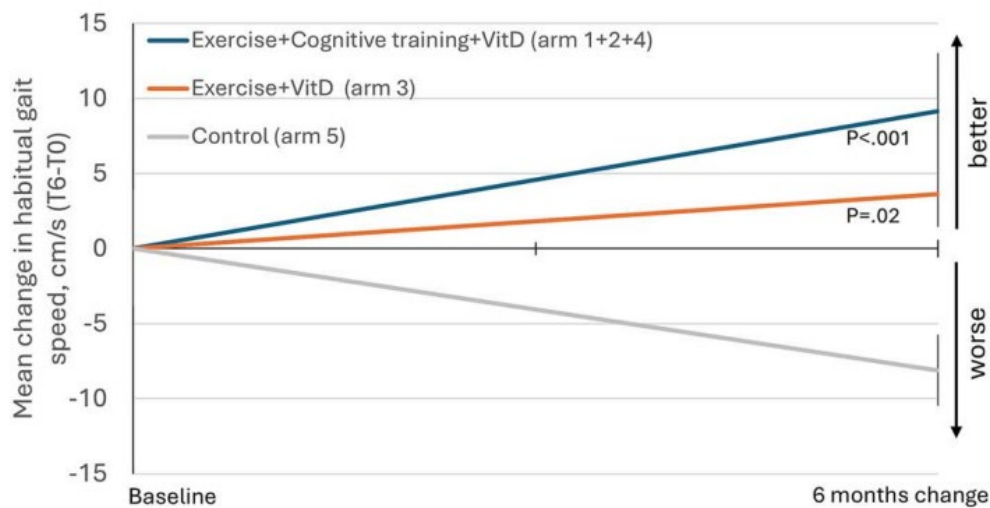
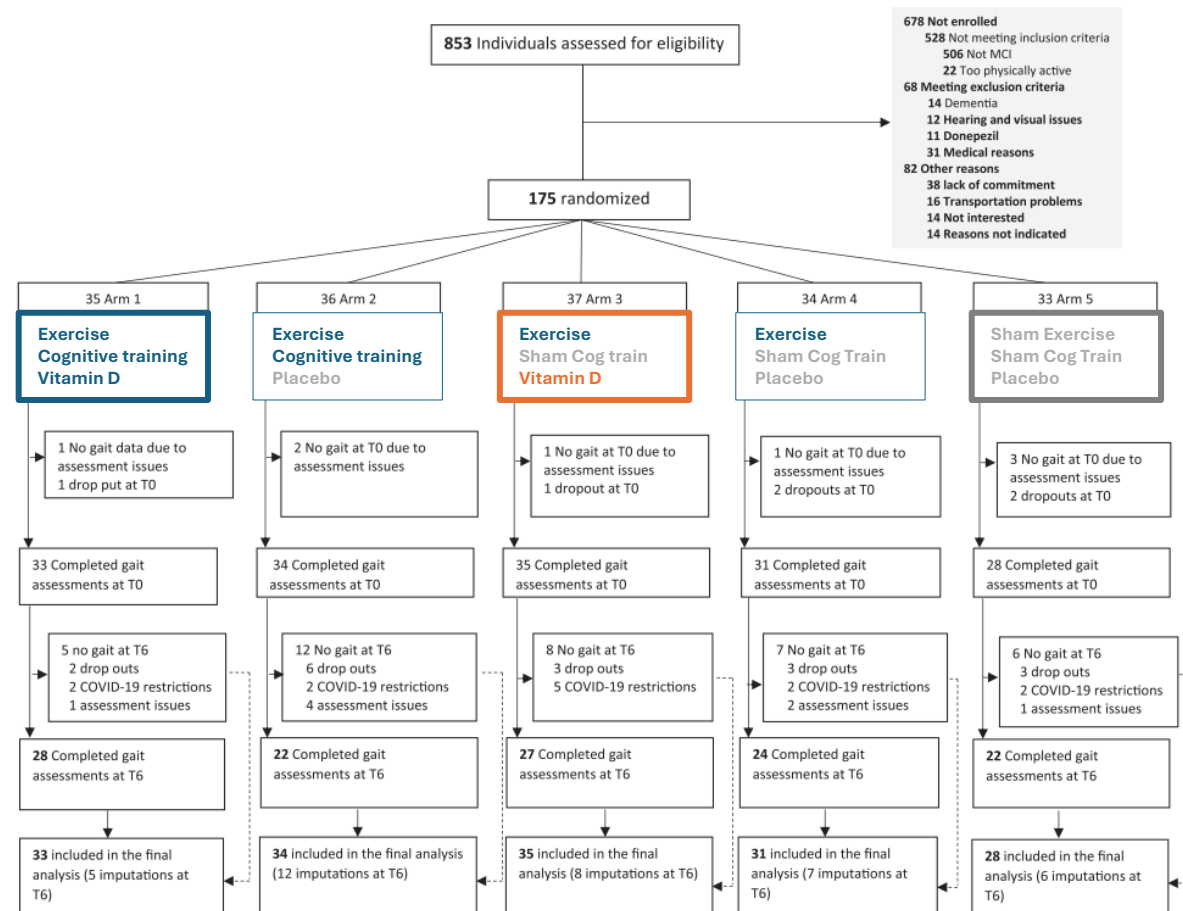
1. habit forming functional exercise (LiFE program) ➤ adherence score 15/24
  2. home fall hazard reduction ➤ 77% implemented >half recommendations
  3. goal directed community mobility coaching ➤ 79% set goals
- 10 home visits



## CLINICAL TRIAL

# Synergistic effects of exercise, cognitive training and vitamin D on gait performance and falls in mild cognitive impairment—secondary outcomes from the SYNERGIC trial

FREderICO PIERUCCINI-FARIA<sup>1,2</sup> , SURIM SON<sup>2,3</sup> , GUANGYONG ZOU<sup>3,4</sup> , QUINCY J. ALMEIDA<sup>5</sup> , LAURA E. MIDDLETON<sup>6,7</sup> , NICK W. BRAY<sup>2,8</sup> , MAXIME LUSSIER<sup>9,10</sup> , J. KEVIN SHOEMAKER<sup>11</sup> , MARK SPEECHLEY<sup>12</sup> , TERESA LIU-AMBROSE<sup>13,14,15</sup> , AMER M. BURHAN<sup>16,17</sup> , RICHARD CAMICOLI<sup>18</sup> , KAREN Z. H. LI<sup>19</sup> , SARAH FRASER<sup>20</sup> , NICOLAS BERRYMAN<sup>21,22,23</sup> , LOUIS BHERER<sup>23,24,25</sup> , MANUEL MONTERO-ODASSO<sup>1,2,3</sup> 



Study or Subgroup	log[Rate Ratio]	SE	Weight	Rate Ratio		Risk of Bias					
				IV, Random, 95% CI	IV, Random, 95% CI	A	B	C	D	E	F
<b>3.8.1 High fall risk</b>											
Lurie, 2013	-0.92	0.36	7.8%	0.40	[0.20, 0.81]	+	+	+	-	?	-
Lurie, 2020	0.1	0.06	19.2%	1.11	[0.98, 1.24]	+	+	?	+	+	?
Maki 2008	0	0.71	2.8%	1.00	[0.25, 4.02]	-	?	-	-	?	-
Mansfield, 2010	0.34	0.65	3.3%	1.40	[0.39, 5.02]	+	+	+	+	+	+
Rieger 2023	-0.23	0.42	6.4%	0.79	[0.35, 1.81]	+	+	+	+	+	+
Shimada 2004	-0.63	0.46	5.7%	0.53	[0.22, 1.31]	+	+	+	+	+	+
<b>Subtotal (95% CI)</b>			<b>45.2%</b>	<b>0.50</b>	<b>[0.28, 0.90]</b>						

Heterogeneity: Tau<sup>2</sup> = 0.13; Chi<sup>2</sup> = 10.77, df = 5 (P = 0.06);  
 Test for overall effect: Z = 1.04 (P = 0.30)

**3.8.2 Healthy**

Aviles, 2019	-0.29	0.67	3.1%
Norgaard, 2023	-0.23	0.17	14.9%
Pai, 2014	-0.69	0.3	9.6%
Rogers, 2021a	-0.16	0.38	7.3%
Rogers, 2021b	-0.81	0.34	8.4%
Wang 2022	0.17	0.25	11.4%
<b>Subtotal (95% CI)</b>			<b>54.8%</b>

Heterogeneity: Tau<sup>2</sup> = 0.05; Chi<sup>2</sup> = 7.72, df = 5 (P = 0.17); I<sup>2</sup> = 56%  
 Test for overall effect: Z = 1.97 (P = 0.05)

**Total (95% CI)** 100.0%  
 Heterogeneity: Tau<sup>2</sup> = 0.08; Chi<sup>2</sup> = 25.33, df = 11 (P = 0.008); I<sup>2</sup> = 57%  
 Test for overall effect: Z = 2.03 (P = 0.04)  
 Test for subgroup differences: Chi<sup>2</sup> = 0.07, df = 1 (P = 0.79)



Shivam Sharma, et al.

# Perturbation-Based Balance Training Reduces Falls and Fall Injuries in Older People: Insights on Mechanisms and Optimal Training Parameters from a Systematic Review and Meta-Analysis

Study or Subgroup	log[Rate Ratio]	SE	Weight	Rate Ratio		Risk of Bias					
				IV, Random, 95% CI	IV, Random, 95% CI	A	B	C	D	E	F
<b>3.1.1 Overground walkway</b>											
Pai, 2014	-0.69	0.3	9.6%	0.50	[0.28, 0.90]	+	+	+	-	?	-
<b>Subtotal (95% CI)</b>			<b>9.6%</b>	<b>0.50</b>	<b>[0.28, 0.90]</b>						
Heterogeneity: Not applicable Test for overall effect: Z = 2.30 (P = 0.02)											
<b>3.1.2 Treadmill</b>											
Aviles, 2019	-0.29	0.67	3.1%	0.75	[0.20, 2.78]	?	+	?	?	?	?
Lurie, 2013	-0.92	0.36	7.8%	0.40	[0.20, 0.81]	+	+	+	-	?	-
Lurie, 2020	0.1	0.06	19.2%	1.11	[0.98, 1.24]	+	+	?	+	+	?
Norgaard, 2023	-0.23	0.17	14.9%	0.79	[0.57, 1.11]	+	+	+	+	+	+
Rieger 2023	-0.23	0.42	6.4%	0.79	[0.35, 1.81]	+	+	+	+	+	+
Shimada 2004	-0.63	0.46	5.7%	0.53	[0.22, 1.31]	+	+	+	+	+	+
Wang 2022	0.17	0.25	11.4%	1.19	[0.73, 1.93]	?	+	?	?	?	?
<b>Subtotal (95% CI)</b>			<b>68.5%</b>	<b>0.85</b>	<b>[0.64, 1.12]</b>						

Study or Subgroup	log[Rate Ratio]	SE	Weight	Rate Ratio		Risk of Bias					
				IV, Random, 95% CI	IV, Random, 95% CI	A	B	C	D	E	F
<b>3.1.3 Standing/Manual</b>											
Maki 2008	0	0.71	2.8%	1.00	[0.25, 4.02]	+	+	+	-	?	-
Mansfield, 2010	0.34	0.65	3.3%	1.40	[0.39, 5.02]	+	+	+	+	+	+
Rogers, 2021a	-0.16	0.38	7.3%	0.85	[0.40, 1.79]	+	+	+	-	?	-
Rogers, 2021b	-0.81	0.34	8.4%	0.44	[0.23, 0.87]	+	+	+	-	?	-
<b>Subtotal (95% CI)</b>			<b>21.9%</b>	<b>0.71</b>	<b>[0.44, 1.12]</b>						

Heterogeneity: Tau<sup>2</sup> = 0.03; Chi<sup>2</sup> = 3.44, df = 3 (P = 0.33); I<sup>2</sup> = 13%  
 Test for overall effect: Z = 1.38 (P = 0.17)

**Total (95% CI)** 100.0% **0.77 [0.60, 0.99]**  
 Heterogeneity: Tau<sup>2</sup> = 0.08; Chi<sup>2</sup> = 25.33, df = 11 (P = 0.008); I<sup>2</sup> = 57%  
 Test for overall effect: Z = 2.03 (P = 0.04)  
 Test for subgroup differences: Chi<sup>2</sup> = 2.55, df = 2 (P = 0.28), I<sup>2</sup> = 21.4%

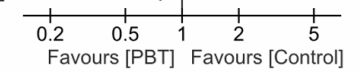
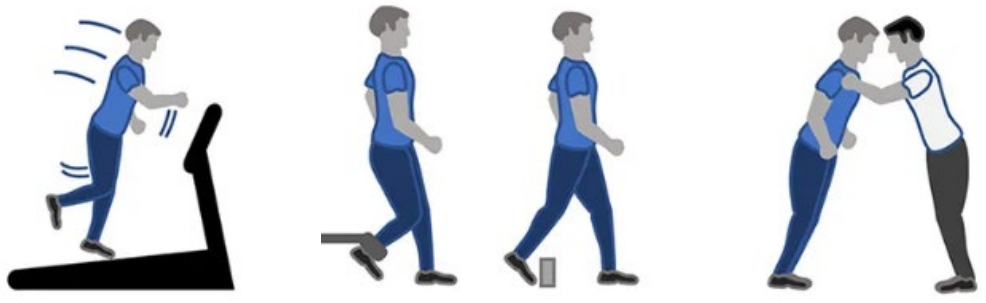
Study or Subgroup	log[Rate Ratio]	SE	Weight	Rate Ratio		Risk of Bias					
				IV, Random, 95% CI	IV, Random, 95% CI	A	B	C	D	E	F
<b>3.9.1 Higher dose (&gt;6 hours)</b>											
Aviles, 2019	-0.29	0.67	3.1%	0.75	[0.20, 2.78]	?	+	?	?	?	?
Maki 2008	0	0.71	2.8%	1.00	[0.25, 4.02]	+	+	+	-	?	-
Mansfield, 2010	0.34	0.65	3.3%	1.40	[0.39, 5.02]	+	+	+	+	+	+
Rogers, 2021a	-0.16	0.38	7.3%	0.85	[0.40, 1.79]	+	+	+	-	?	-
Rogers, 2021b	-0.81	0.34	8.4%	0.44	[0.23, 0.87]	+	+	+	-	?	-
Shimada 2004	-0.63	0.46	5.7%	0.53	[0.22, 1.31]	+	+	+	+	+	+
<b>Subtotal (95% CI)</b>			<b>30.6%</b>	<b>0.67</b>	<b>[0.46, 0.97]</b>						

Heterogeneity: Tau<sup>2</sup> = 0.00; Chi<sup>2</sup> = 3.74, df = 5 (P = 0.59); I<sup>2</sup> = 0%  
 Test for overall effect: Z = 2.11 (P = 0.03)

Study or Subgroup	log[Rate Ratio]	SE	Weight	Rate Ratio		Risk of Bias					
				IV, Random, 95% CI	IV, Random, 95% CI	A	B	C	D	E	F
<b>3.9.2 Lower dose (&lt;6 hours)</b>											
Lurie, 2013	-0.92	0.36	7.8%	0.40	[0.20, 0.81]	+	+	+	-	?	-
Lurie, 2020	0.1	0.06	19.2%	1.11	[0.98, 1.24]	+	+	?	+	+	?
Norgaard, 2023	-0.23	0.17	14.9%	0.79	[0.57, 1.11]	+	+	+	+	+	+
Pai, 2014	-0.69	0.3	9.6%	0.50	[0.28, 0.90]	+	+	+	-	?	-
Rieger 2023	-0.23	0.42	6.4%	0.79	[0.35, 1.81]	+	+	+	+	+	+
Wang 2022	0.17	0.25	11.4%	1.19	[0.73, 1.93]	?	+	?	?	?	?
<b>Subtotal (95% CI)</b>			<b>69.4%</b>	<b>0.80</b>	<b>[0.59, 1.10]</b>						

Heterogeneity: Tau<sup>2</sup> = 0.09; Chi<sup>2</sup> = 17.07, df = 5 (P = 0.004); I<sup>2</sup> = 71%  
 Test for overall effect: Z = 1.37 (P = 0.17)

**Total (95% CI)** 100.0% **0.77 [0.60, 0.99]**  
 Heterogeneity: Tau<sup>2</sup> = 0.08; Chi<sup>2</sup> = 25.33, df = 11 (P = 0.008); I<sup>2</sup> = 57%  
 Test for overall effect: Z = 2.03 (P = 0.04)  
 Test for subgroup differences: Chi<sup>2</sup> = 0.55, df = 1 (P = 0.46), I<sup>2</sup> = 0%






# **IMPLEMENTATION OF FALL PREVENTION STRATEGIES**




## Falling short on implementation of fall prevention guidelines in health services: a systematic review with meta-analysis

Melanie N Haley , Catherine Sherrington, Katherine Lawler, Katherine E Harding, Margaret Lord, Stuart Williams, Nicholas F Taylor

*Age and Ageing*, Volume 54, Issue 10, October 2025, afaf307,

- 55 studies
- >115 000 patients
- 14 fall prevention guidelines
- Methodological quality poor
- Median reach of guideline implementation 64%
- Implementing guidelines did not prevent falls
- Adoption of fall prevention recommendations by health professionals improved
- Adherence of patients to recommendations ranged 7-73%.

# Effectiveness of implementation strategies for uptake of fall prevention interventions in community care: A systematic review

Siv Linnerud, Linda Aimée Hartford Kvæl, Birgitte Graverholt, Maria Bjerk, Kristin Taraldsen, Therese Brovold 

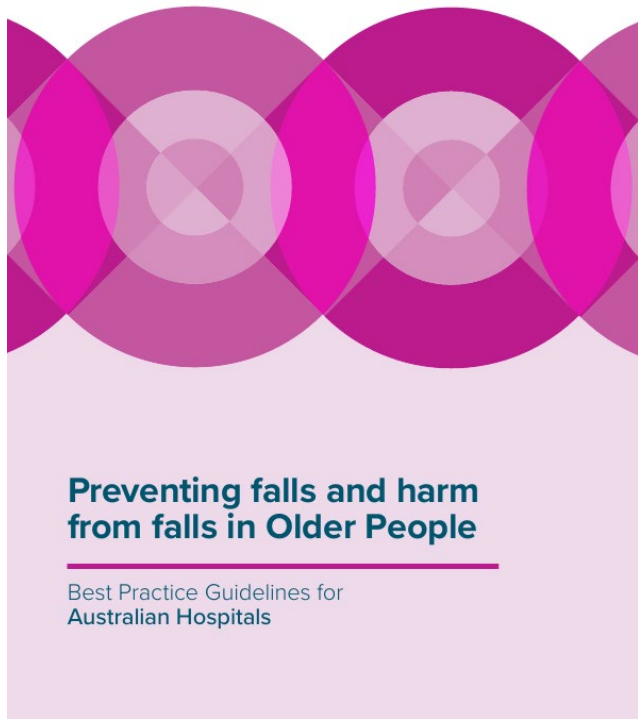
- 4 papers (3 studies)
- 2/3 studies were Stepping on
- A systematic implementation strategy to train/educate stakeholders can improve the number of fall prevention interventions hosted by counties and communities.
- Significant gap in research concerning the effectiveness of implementation strategies for integrating fall prevention interventions into practice.

Study (year)	Single strategies of the implementation strategy	Direction of effects	
		Favors Impl. strategy	Favors control
<b>Implementation outcomes: Number of fall prevention interventions held</b>			
Ford (2017)	Train-the-trainer Conduct educational outreach visits Recruit, designate and train for leadership Facilitation	X	
Guse (2015)	Access new funding Assess for readiness and identify barriers and facilitators Conduct local needs assessment Facilitate relay of clinical data to providers Provide local technical assistance Use implementation advisor Make training dynamic Distribute educational materials	X	
<b>Clinical outcomes: Falls injuries resulting in emergency department or hospital admission</b>			
Ganz (2015)	Audit and provide feedback Distribute educational materials Make training dynamic Remind clinicians		X
Guse (2015)	Access new funding Assess for readiness and identify barriers and facilitators Conduct local needs assessment Facilitate relay of clinical data to providers Provide local technical assistance Use implementation advisor Make training dynamic Distribute educational materials	X	

# Australian Fall Guidelines - 2025

- Based on Cochrane review and expert advice
- Settings: hospitals, residential aged care, community care

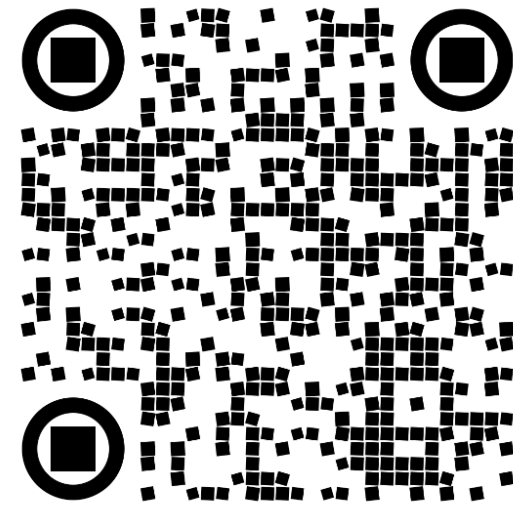
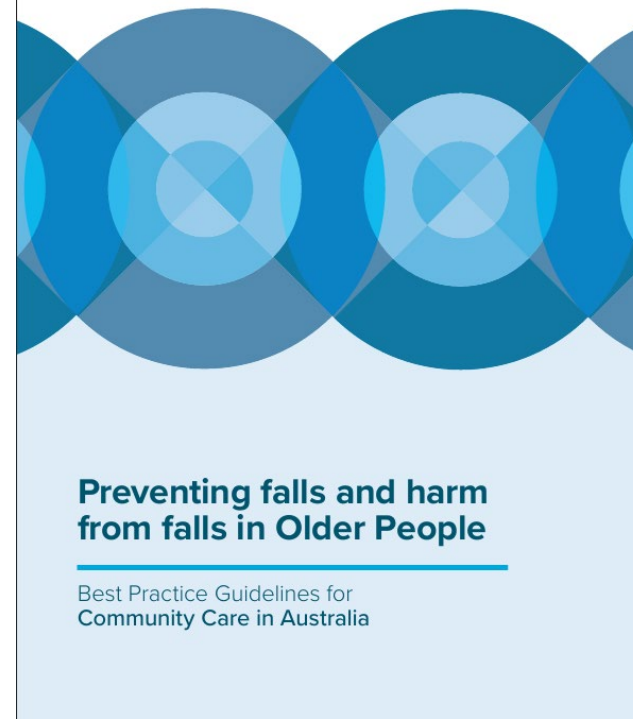
AUSTRALIAN COMMISSION  
ON SAFETY AND QUALITY IN HEALTH CARE



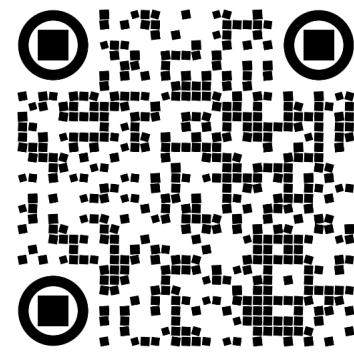
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ON SAFETY AND QUALITY IN HEALTH CARE



AUSTRALIAN COMMISSION  
ON SAFETY AND QUALITY IN HEALTH CARE



# Australian Fall Guidelines



## Areas of focus for best practice in fall prevention

consider the following risk factors:



Fall risk assessment



Balance and mobility



Cognitive impairment



Continence



Feet and footwear



Syncope



Dizziness and vertigo



Vision



Hearing



Environmental risks



Medicine and Medicines Review



Osteoporosis



Restrictive practices



Hip protectors



Monitoring and observation

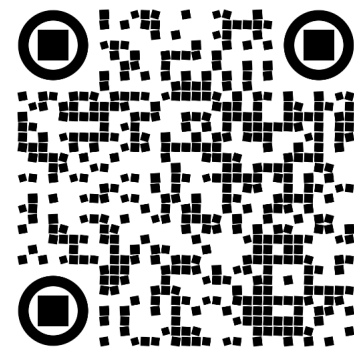


Vitamin D and calcium

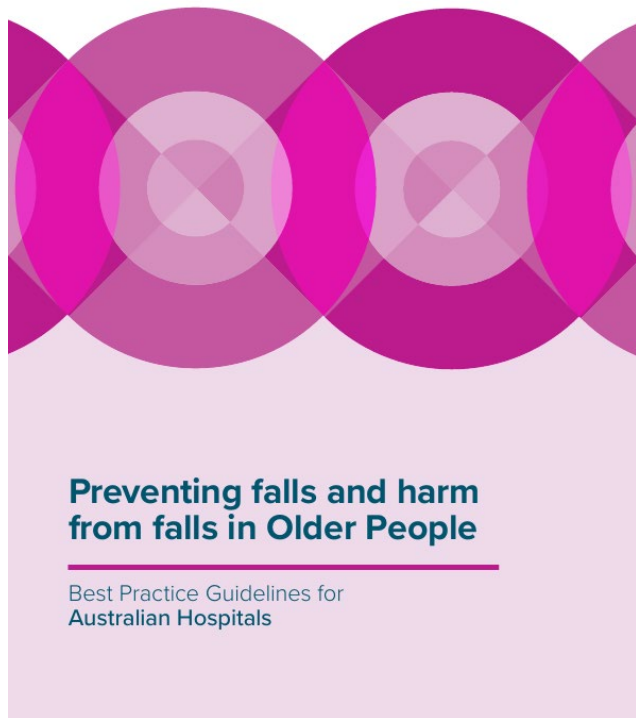


Post-fall management

# Australian Fall Guidelines - HOSPITAL

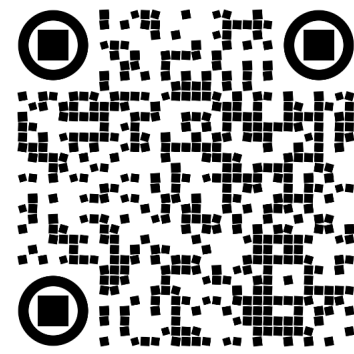


AUSTRALIAN COMMISSION  
ON SAFETY AND QUALITY IN HEALTH CARE

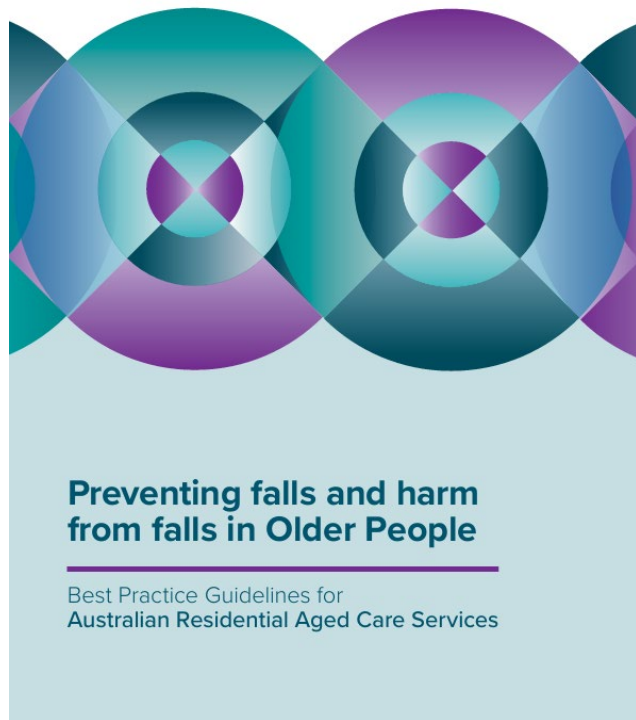


- Personalised multifactorial fall prevention intervention
- Tailored education – patients, staff, families
- Geriatric orthopaedic care post hip fracture
- Home safety by OT upon discharge

# Australian Fall Guidelines – AGED CARE

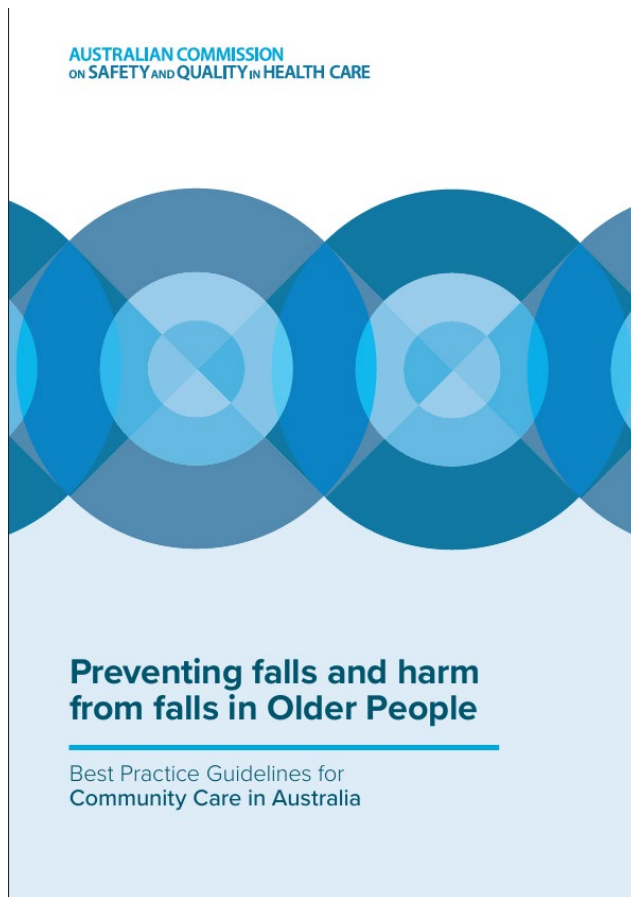
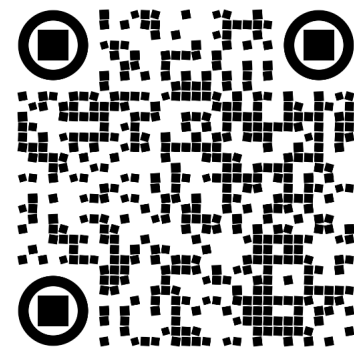


AUSTRALIAN COMMISSION  
ON SAFETY AND QUALITY IN HEALTH CARE



- Multifactorial fall prevention intervention (personal and targeted)
- Tailored supervised exercise (must be ongoing)
- Diets with adequate protein and calcium (3.5 daily servings of dairy)
- Vitamin D supplements (daily or weekly)
- Osteoporosis medications as required
- Consider hip protectors

# Australian Fall Guidelines – COMMUNITY



For all:

- Exercise – balance training, functional

Increased risk:

- Exercise – individually tailored
- Home safety intervention
- Multi-component intervention

As required:

- Podiatry
- Cataract surgery
- Medication review
- Pacemakers
- Eyewear prescription
- Vitamin D supplementation
- Osteoporosis medications

# New guidelines published



## Guidelines for Adults & Older Adults (18 years and over)

Replacing sitting time with any kind of physical activity and getting enough sleep improves your health

### Adults & Older Adults (18 YEARS AND OVER)

A healthy 24-hours includes:

Physical activity:

- Moderate-to-vigorous intensity, 30+ mins, most days
  - Muscle-strengthening, 2+ days/week
  - Functional activities: mobility, balance, coordination, 3+ days/week
  - Several hours light-intensity, daily
- 
- Less sedentary time
  - Sufficient sleep

### Adults & Older Adults WITH DISABILITY

A healthy 24-hours includes:

Physical activity:


### Adults & Older Adults WITH CHRONIC CONDITIONS

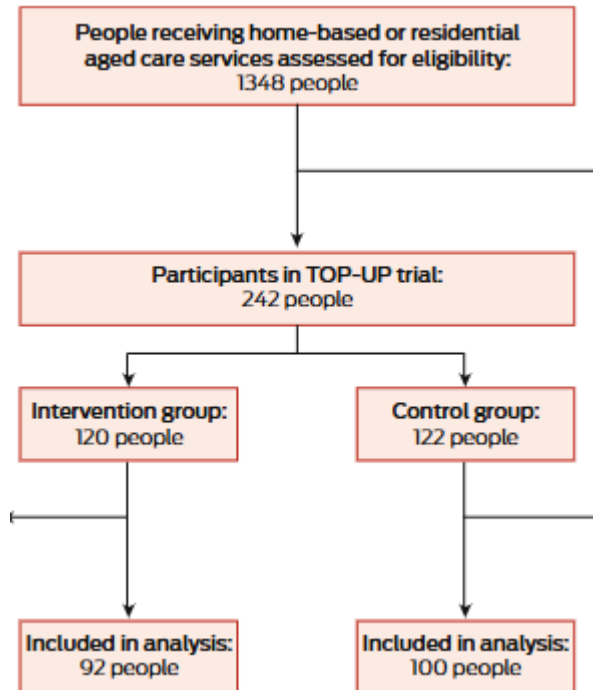
A healthy 24-hours includes:

Physical activity:



# The Telephysiotherapy for Older People (TOP-UP) program for improving mobility in people receiving aged care: a hybrid type 1 effectiveness-implementation randomised controlled trial

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10 Physio telehealth sessions over 6 months over Zoom



2 hours of exercise per week supported by online exercise

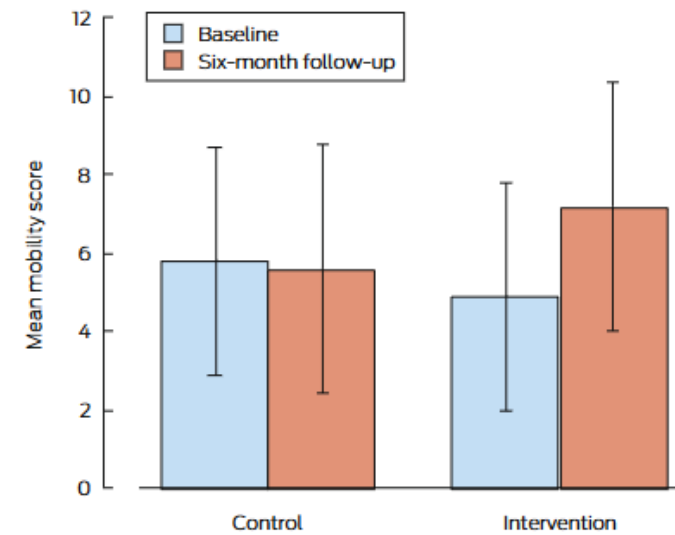


Progressive, tailored balance and strength moderate-intensity exercise (Otago informed)



Care staff (coaches) support participants one hour per week

Short Physical Performance Battery



**38% fewer fallers**



► Age Ageing. 2024 Sep 19;53(9):afae177. doi: [10.1093/ageing/afae177](https://doi.org/10.1093/ageing/afae177)

## Association between dizziness and future falls and fall-related injuries in older adults: a systematic review and meta-analysis

[Yuxiao Li](#) <sup>1,✉</sup>, [Rebecca M Smith](#) <sup>2</sup>, [Susan L Whitney](#) <sup>3</sup>, [Barry M Seemungal](#) <sup>4</sup>, [Toby J Ellmers](#) <sup>5,✉</sup>

- 29 studies
- 103,306 participants
- Higher odds of:
  - any falls (OR=1.63)
  - Recurrent falls (OR=1.98)

*Original Research—Otology and Neurotology*

## Long-Term Benign Paroxysmal Positional Vertigo: Recurrence, Residual Symptoms and Risk of Falls

**Eduardo Martin-Sanz, PhD** <sup>1,2</sup> ,  
**Marta Chaure-Cordero, PhD** <sup>1,#</sup> ,  
**Carlos Fernández-Navarro, MD** <sup>1</sup> , **Ana Solis-Fesser, MD** <sup>1</sup> ,  
and **Juan Riestra-Ayora, PhD** <sup>1,2</sup>

- Tertiary referral centre
- 361 BPPV patients, mean age 63 years
- 7 year follow up
- Falls reported by 19% of patients
  - Vestibular rehabilitation OR=3.7
  - Residual dizziness OR=5.7