

## Falls in polio survivors

**Alice Bickerstaffe, MD\***

Anita Beelen PhD\*, Frans Nollet, MD PhD\*

AMC Amsterdam

\*Department of rehabilitation, University of Amsterdam, Academic Medical Centre, The Netherlands

# Programme



- 
- 1 **General overview** – *Falls research*
  - 2 **AMC study falls** – *Methods, Results, Conclusions*
  - 3 **Future research plans**
  - 4 **Discussion** – *Conclusions and Key Points*
  - 5 **Questions**
-

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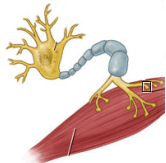
# 1. General Overview



- Leading cause of - Morbidity
- Mortality
- High health care costs

- >55 years  $\Rightarrow$  ~20%  $\geq$  1 fall per year

- >75 years  $\Rightarrow$  ~37%  $\geq$  1 fall per year



NMD

- 70%  $\geq$  1 fall per year (n=66, mean age 49\*)

*Pieterse et al, 2006\**



# 1. General Overview

- Muscle weakness is risk factor for falls
- Polio survivors have muscle weakness
- Muscle & joint pain, fatigue



Polio survivors fall frequently?





# 1. General Overview


## Falls in polio survivors, 5 studies\*

- Frequency:

50-84%  $\geq 1$  fall per year

25-68%  $\geq 2$  falls per year

- Consequences:

-  38% in 5 years  
35% at some point

-  61%-95%  
18-82% changing activities

\* Lord 2002, Silver 2002, Hill 2004, Legters 2006, Mohammad 2009



# 1. General Overview

Falls in polio survivors, 5 studies\*

Large variation in:

- Number of participants: n=28-233
- Period of time reported: 6 months-1 year-5 years
- Number of falls deemed significant:  $\geq 1$ -  $\geq 2$ -  $\geq 3$
- Different research questions

\* *Lord 2002, Silver 2002, Hill 2004, Legters 2006, Mohammad 2009*

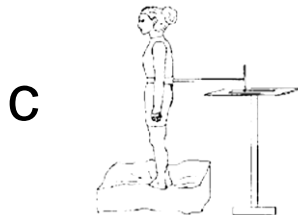
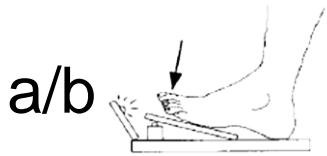


# 1. General Overview

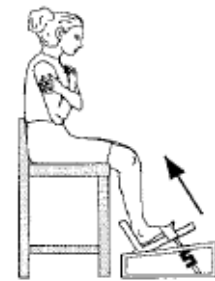
- Circumstances: Hill 2004
    - $\frac{2}{3}$  walking
    - $\frac{1}{2}$  outdoors
    - $\frac{1}{2}$  extrinsic hazard
- } Very small sample size

Associated factors: Lord 2002

- Frequent fallers had:



- a. Reduced foot tapping speed
- b. Slow reaction times
- c. Increased body sway
- d. Reduced lower limb strength



d



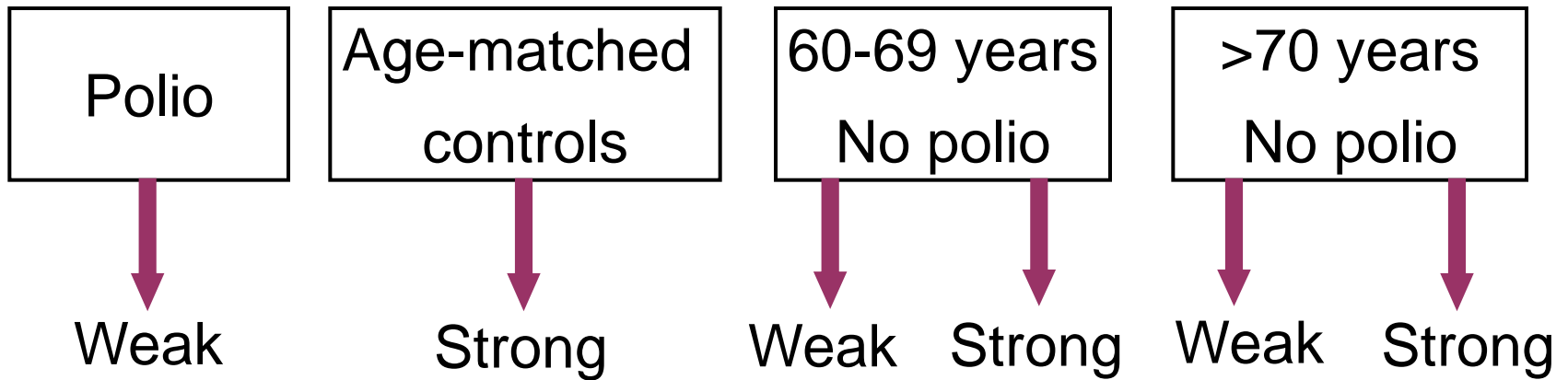
# 1. General Overview

- Other possible underlying mechanisms:
  - Fear of falling
  - Joint & muscle pain
  - Fatigue
  - Relative loss of proprioception\*

\* *Butler et al, 2008*

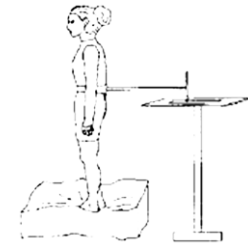


# 1. General Overview



Polio & weak 60-69 year groups:

- Normal vision and somatosensory tests
- Large increase sway upon closing eyes when on foam



\* Butler et al, 2008



# 1. General Overview

- Conclusion previous research:
  - Falls are a problem
  - There are no comprehensive fall intervention strategies
  - Some fall mechanisms are clear, but many aren't
- Circumstances of falls and associated factors

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## 2. Research Questions

- Is falling a problem for polio survivors?
- Frequency
  - Consequences

- If so, what are the ... ?
- Circumstances of falls
  - Factors associated with falls



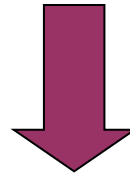
**Intervention programmes**

## 2. Methods



376 polio survivors approached

305 participated (81%)



- Questionnaire
- Medical files



## 2. Methods: Outcome Measures

### Frequency:

- Fallers:  $\geq 1$  fall last year
- Recurrent fallers:  $\geq 2$  falls last year

### Consequences:

- Fear of falling:



Yes/No

10 item FES-scale

- Injuries:



minor

major: fractures separate

# 2. Methods: Outcome Measures



## Circumstances:

- Time



- Shoes

- Activity



- Location



- Floor



## 2. Methods: Outcome Measures

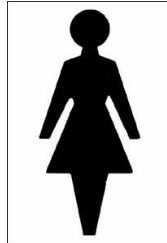
### Basic demographics

Increased age

Female

Immigrant

Living alone



### Other

Physical complaints

Medication

Type

$\geq 4$

Fear of falling



### Disease characteristics

PPS

Muscle weakness lower limb

Walking ability

Walking aid

Orthopaedic shoes

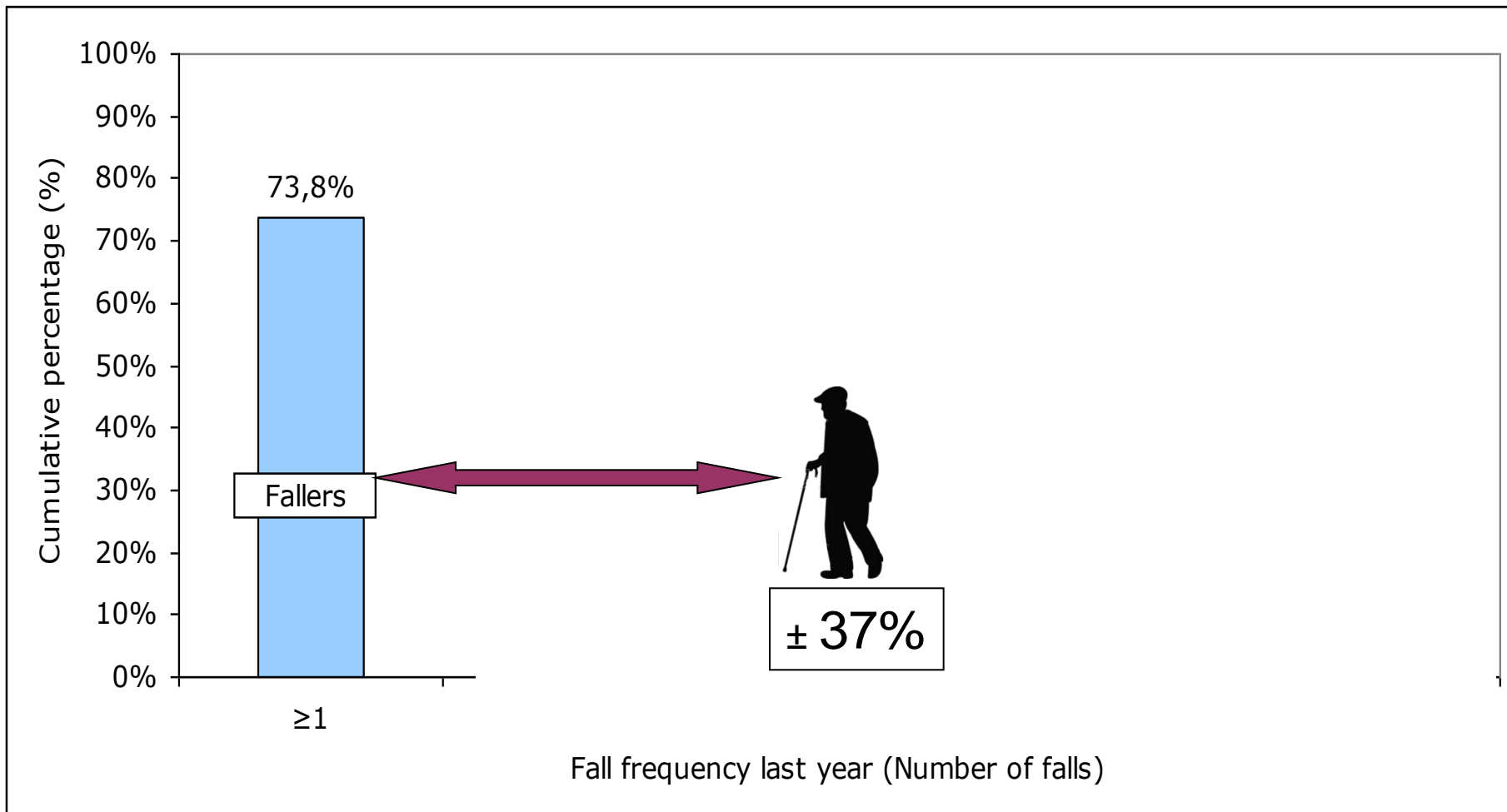
Orthosis



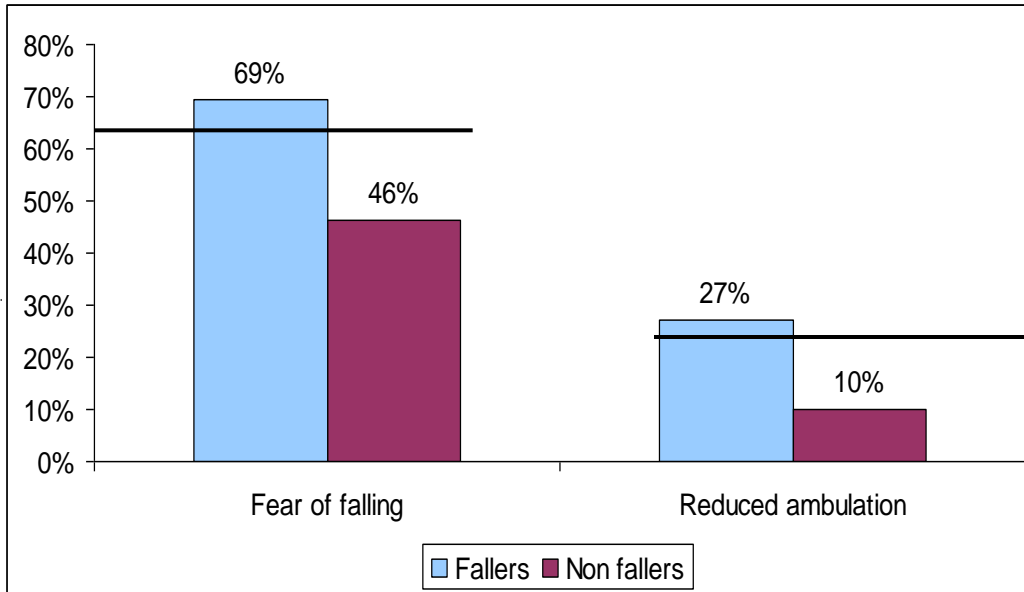
**Logistic regression**



## 2. Results: Frequency



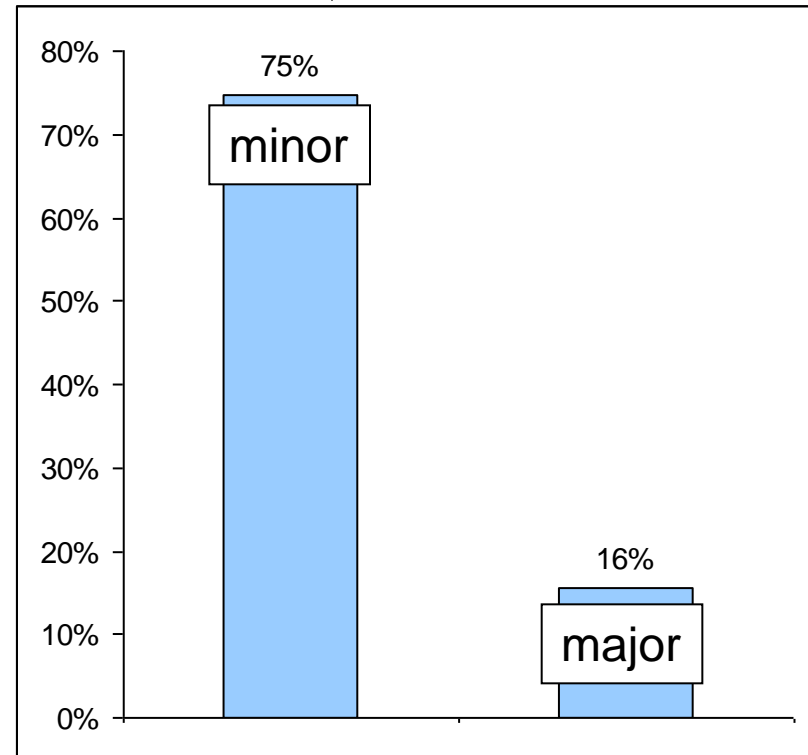
# 2. Results: Consequences



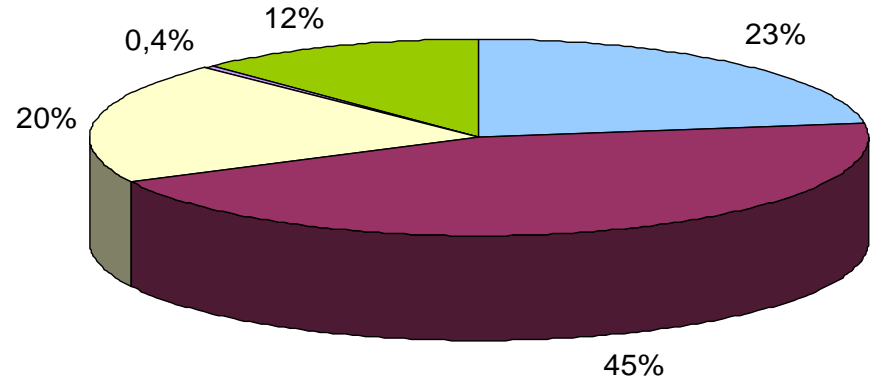
Fear of falling



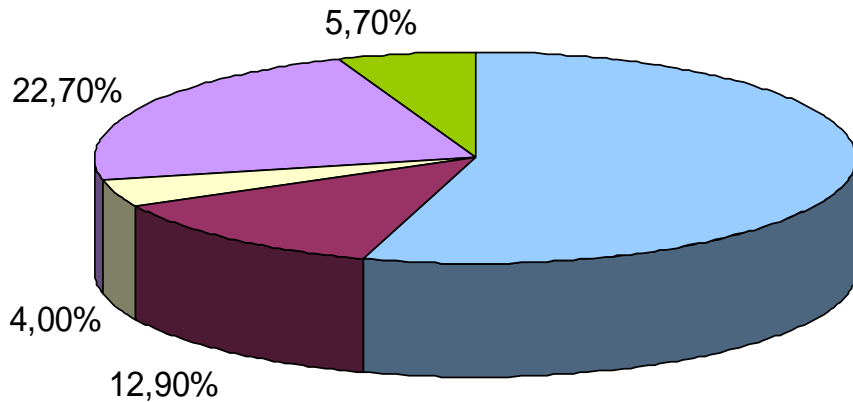
Injuries



# 2. Results: Circumstances



■ Morning 
 ■ Afternoon 
 ■ Evening 
 ■ Night 
 ■ Missing

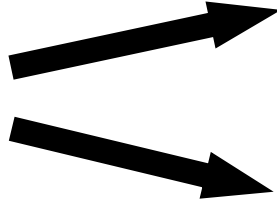


Activity

<span style="color: blue;">■</span> Walking	<span style="color: purple;">■</span> Transfer/posture change
<span style="color: yellow;">■</span> De- / ascending stairs	<span style="color: lightblue;">■</span> Various tasks in & around the house
<span style="color: green;">■</span> Missing	



## 2. Results: Circumstances



86% in a familiar location

50% in and around the home



53.4% has orthopaedic shoes

23.5% were wearing them!



11% Slips

21% Trips



# Results: Associated factors

Risk factor	Falls ( $\geq 1$ )		Recurrent falls ( $\geq 2$ )	
	Exp B	95%CI	Exp B	95%CI
Balance problems	3.42	1.87 - 6.25	3.01	1.78-5.08
Quadriceps weakness	2.66	1.42 – 4.89	1.88	1.11-3.18
Fear of falling	1.98	1.08 – 3.61	1.72	1.01-2.94



## 4. Conclusion

- Fall frequency is **high** and there is a high proportion of **fear**, **injuries** and **activity avoidance**
- Falls mainly occur:
  - **Ambulation**
  - **Afternoon**
  - **Inside the home**
- Factors associated with falls:
  - **Self-reported balance problems**
  - **Quadriceps weakness**
  - **Fear of falling**

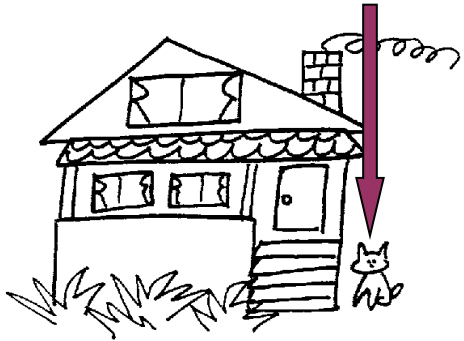


Proprioceptive loss  
Increased sway  
Slow reaction times

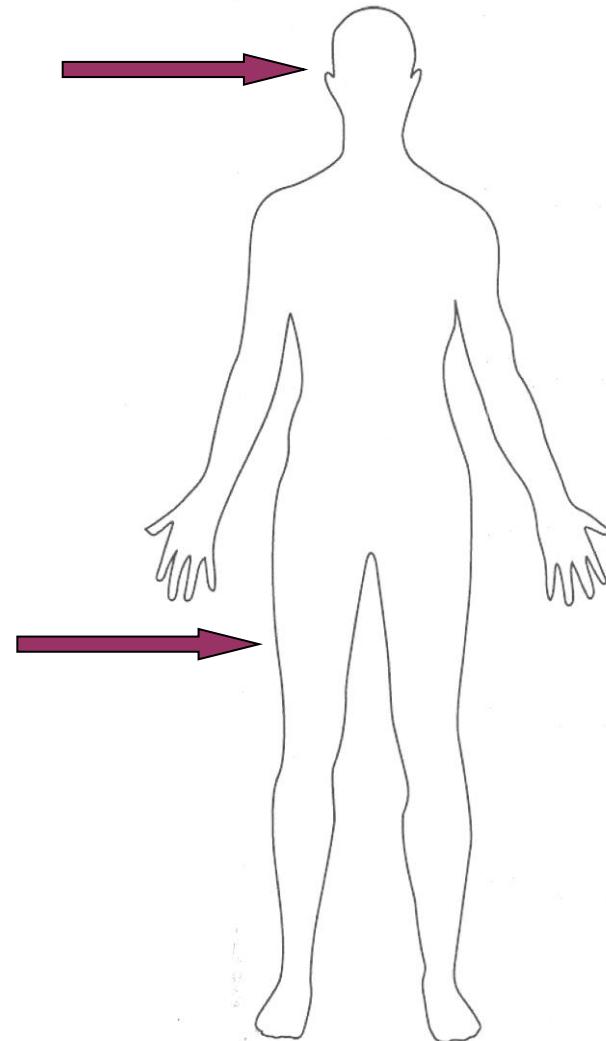


## 4. Conclusion

- Focus of interventions:
  - Cognitive aspect: fear
  - Balance/ strength training
  - Reducing domestic hazards



- Further research



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### 3. Future research plans

- Balance: static & dynamic balance
- Gait analysis: fall risk moments
- Fall intervention study: RCT
  - **Goal:** improving balance and reduction of fear of falling
  - **By:** 6 week exercise programme
  - **Focus:** optimisation of balance during functional tasks involving posture changes and gait



# 3. Future research plans

- Optimisation of gait & postural change

## *Individual sessions*



3D clinical gait analysis

Gait optimisation

## *Group sessions*

Weight bearing exercises

Fall & recovery techniques

Walking exercises

Intensive balance training



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## 4. Key Points



- Falls are a clinically important problem for polio survivors



- No known effective intervention



- An intervention study should target polio-specific fall mechanisms for maximum effect.

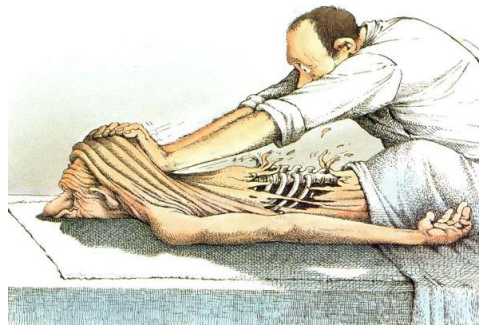
- Lower limb muscle weakness
- Fear of falling
- Complaints of problems maintaining balance
- Loss of proprioception (Butler, et al)
- Reaction time (Lord, et al)



## 4. Key Points



- In the meantime, clinical recommendations are possible:
  - Ask your patients about falls!!
  - How often?
  - Where?
  - When?
  - Why?
  - Consequences?
  - Discuss possible treatment options



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# 5. Questions



Alice Bickerstaffe

[a.bickerstaffe@amc.nl](mailto:a.bickerstaffe@amc.nl)