Exercise for falls prevention: past, present and future

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First attempts to change practice
First attempts to raise awareness

1997

2001

2004
Definition
An unexpected event in which the participant comes to rest on the ground, floor, or lower level.

Lay definition
Any fall including a trip or slip in which you lose your balance and land on the floor or ground or lower level.

Lamb et al. 2005 JAGS
Repeated attempts to change practice

A lot on assessment and case finding, not a lot on detail of effective interventions!
National Indicators and getting GPs on board...

1996-9: BGS tried to get falls and fractures onto the Quality Outcomes Framework. No luck – too expensive!

From 1\textsuperscript{st} July 2017, all GPs to “use an appropriate tool, e.g. Electronic Frailty Index (eFI) to identify patients aged 65 and over who are living with moderate and severe frailty”

[GP General Medical Services (GMS) contract, CQUINS]

Will ask if the patient has fallen in the last 12 months and provide relevant interventions.
When do we become “fallers”?

When intrinsic (personal) abilities to remain upright cannot cope with extrinsic (external) risk factors:

- Nervous system, reaction times and gait speed slows
- Balance and strength deteriorates
Frailty - a loss of physiological reserve

Frailty syndromes (and falls) present in crisis

FUNCTIONAL ABILITIES

Independent

“Minor illness” eg UTI

Dependent

Hyper-acute Frailty syndromes:
- Immobility
- Falls
- Delirium
- Fluctuating disability
- Incontinence

(Clegg, Young, Rockwood Lancet 2013)
3 Dimensions of Human Frailty

DISEASE

TIME

HUMAN FRAILTY

DISUSE

Spirduso, 1995
## Risk Factors for Falls

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>All Fallers (Odds Ratio)</th>
<th>Recurrent Fallers (Odds Ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of Falls</td>
<td>2.8</td>
<td>3.5</td>
</tr>
<tr>
<td>Gait Problems</td>
<td>2.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Walking Aids Use</td>
<td>2.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Vertigo</td>
<td>1.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Parkinson’s Disease</td>
<td>2.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Antiepileptic Drug Use</td>
<td>1.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Physical Disability</td>
<td>1.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Disability in Instrumental Activities in Daily Life</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Fear of Falling</td>
<td>1.6</td>
<td>2.5</td>
</tr>
</tbody>
</table>

All fallers = fell at least once during follow up
Recurrent fallers = fell at least twice during follow up

Ageing affects all of us!

1-2% in functional ability p.a.

- Strength
- Power
- Bone density
- Flexibility
- Endurance
- Balance and co-ordination
- Mobility and transfer skills

Sedentary behaviour accelerates the loss of performance...
Exercise to Prevent Falls

Exercise helps fallers and non-fallers in a number of ways:

- Reducing Falls (or injurious falls)
- Reducing known Risk Factors for falls
- Reducing Fractures? (or changing the site of fracture)
- Increasing Quality of Life & Social Activities
- Reducing Social Isolation/Loneliness/Fear
- Reducing Institutionalisation

Wide range of abilities and needs

Figure 4. Maintaining functional capacity over the life course

- **Early Life**: Growth and development
- **Adult Life**: Maintaining highest possible level of function
- **Older Age**: Maintaining independence and preventing disability

- **Functional Capacity**
- **Age**

*Disability threshold*

Range of function in individuals

Rehabilitation and ensuring the quality of life

Source: Kalache and Kickbusch, 1997
Secondary falls prevention exercise

- Otago Home Exercise Programme (OEP)
  - 1 yr; 3 x p/w; 6 home visits and telephone support
  - 6 mths; 3 x p/w (1 p/w group, 2 p/w home) exercise instructor
  - Effects on strength and balance more pronounced when run in a group

- Falls Management Exercise Programme (FaME/PSI)
  - 9 mths; 3 x p/w (one group, two home); includes floorwork;
  - Increases habitual physical activity as well

(Campbell 1997; Robertson 2001; Campbell 2005; Liu_Ambrose 2008; Kyrdalen 2014; Skelton 2005, 2008)
What makes the difference?

• Greatest effects of exercise on fall rates (38% reduction) from interventions including:
  – Highly challenging balance training
  – High dose (50+ hours)
  – Progressive strength training
  – No walking program

• These types of exercise also reduce fear of falling

Sherrington et al., JAGS 2008, NSWPHB 2011
Kendrick Cochrane Review FoF 2014
Effective Falls prevention exercise

- Emerging
  - Different programmes for different populations
  - Primary prevention VS targeting those at high risk / frequent fallers / frail older people

- Some exercise ineffective
- Some exercise unsafe

Safe medical devices / Safe exercise

• Grabrails, stairlifts – all have to have QA/CE marks & safety/effectiveness evaluation
• ‘copies’ and ‘imports’ – safety/effectiveness??
• Exercise for falls prevention ?? Should it have the same stringent QA
  – Secondary falls prevention - Physios/L4 Specialist Instructors – UK Exercise Referral Framework (Skills Active/REPs/CIMSPA)
  – Primary falls prevention – L3 Ex Referral Instructors or L3 older adult instructors
NOT Brisk walking!!

- Women, previous upper arm fracture
- Excluded
  - bisphosphonates, survival < 1yr, cognitive impairment, too frail
- Intervention: Brisk walking
- Control: exercise of upper arm
- Falls risk (Brisk walking > control)
- Fracture risk (Brisk walking > control)

Ebrahim et al. (1997)
Walking – most common activity and most commonly recommended activity – many benefits but...
Keep on Walking..

Put strength and balance ‘on the map’ with walk leaders

5 CALF RAISES WITH SUPPORT:

Stand tall facing a bench or table.
Hold on and look straight ahead.
Position your feet hip width apart.
Slowly and with control come up onto your toes and lower your heels back down.
Repeat this exercise 5 times, building up to 10 or more.
This exercise strengthens your calf muscles and toe joints. It helps you manage everyday activities such as hanging out washing or reaching up into high cupboards.
Exercise opportunities in UK Falls Services

81% run strength and balance training classes (based on Otago and FaME)

BUT.....

Average once a week for 8 weeks!

Lamb et al, SDO report, 2008
Lack of fidelity....

• More than half the class seated

• Average duration 8 weeks and frequency once per week! = 8 hours!

• Little strength progression
  – Ankle weights often not increased
  – Max 2 therabands progression

Highly challenging balance?  
Ineffective dose?  

Lack of strength progression?

No services record falls as outcomes, only strength and balance – all showed improvements BUT.... We have no idea if there were less falls
Transitioning onto other exercise opportunities

• Vital
  – to meet effective dose requirements (>50 hours)

• Important
  – to encourage an active lifestyle beyond rehabilitation
  – to ensure a change in exercise habits and continue to improve social involvement
  – to ensure the opportunities continue to improve strength and balance (eg. not seated!)
Fallers Exercise Continuum

Referral/Assessment

‘FaME’ COMMUNITY FALLS EXERCISE GROUPS

OTAGO HOME EXERCISE PROGRAMME

CHAIR BASED EXERCISE GROUP

In-Hospital Ward Out-patients groups and individual training

Group/individual training Out-patients Community based Residential Settings

Community Exercise Sessions (Otago/FaME/Other) GP / Exercise Referral Tai Chi Dance Walking Groups
Age UK Expert Series

- Dissemination: Translating Research into Best Practice
- Clear easy read
- Reminders of the evidence base
- Good examples of practice
- Good examples of evaluation
- Good examples of transitions on after rehabilitation
Physical activity benefits for adults and older adults

+ BENEFITS HEALTH

ZZz IMPROVES SLEEP

🗑️ MAINTAINS HEALTHY WEIGHT

🧠 MANAGES STRESS

😊 IMPROVES QUALITY OF LIFE

REDUCES YOUR CHANCE OF

Type II Diabetes -40%
Cardiovascular Disease -35%
Falls, Depression and Dementia -30%
Joint and Back Pain -25%
Cancers (Colon and Breast) -20%

What should you do?

For a healthy heart and mind: Be Active
To keep your muscles, bones and joints strong: Sit Less
To reduce your chance of falls: Build Strength, Improve Balance
Meeting the guidelines? The forgotten ones!

- Continuing focus on aerobic activity
- 2012–2014 Scottish Health Survey respondents
  - 10,488 adults aged 16-64 yrs & 3,857 >65s
- 31% percent of men and 24% of women met the muscle strengthening guideline
  - half that of published figures for aerobic physical activity.
- Only 19% percent of older men and 12% of older women met the balance & co-ordination guidelines.

Strain et al. BMC Public Health (2016) 16:1108
Fear of Falling

- Fear and lack of confidence in balance predict
  - Deterioration in physical functioning
  - Decreases in physical activity, indoor and outdoor
  - Increase in fractures
  - Admission to Institutional Care

“It’s the fear that restricts me. In my mind I know that I can’t [walk outside]. The fear of falling and not having the strength to go out, that stops me from going out…”

(Female, 60yrs)

Challenges

• Cultural norm is for older people to sit!
• They sit for 8-12 hours of their day
• We encourage them to sit – everywhere!

• If they attend rehabilitation or exercise they are then sedentary the rest of the day and next day! (fatigue, compensation)

• We need to tackle sedentary behaviour!
Sedentary Behaviour (prolonged sitting)  
Active bone and strength loss

- No standing activity leads to active loss of bone and muscle
  - 1 wk bed rest ↓ leg strength by ~ 20%
  - 1 wk bed rest ↓ spine BMD by ~1%
- Sedentary Behaviour linked to low BMD (independent of physical activity).
- Nursing home residents and those in hospital spend 80-90% of their waking day seated or lying down

(Krolner 1983; Tinetti 1988; Skelton 2001; Dallas Bed Rest Studies 1966-present; Chastin et al. 2011; Beyer 2002)
Sedentary behaviour health risks

In older adults (>60 years old), sedentary behaviour has been found to be significantly associated with:

- Higher plasma glucose
- Higher BMI and waist:hip ratio
- Higher cholesterol
- Reduced muscle strength
- Reduced bone density
- More falls / frailty

Sedentary behaviour is also linked to musculoskeletal pain and can affect quality of life, social inclusion and engagement

• Hospital admission in past 12 months single most predictive risk for functional decline
• Functional decline after hospital discharge 10% to 50%
• Optimizing physical activity of patients low priority compared to patient safety
• Some felt movement was unsafe without physiotherapy input
• No mobility action plans

Intervening on sitting time

- Two ways of thinking about ‘sitting less’
  - Reduce time spent sitting
  - Break up periods of sitting (‘sitting bouts’)

SOS Study – over 10 weeks, adding 10-15 sit to stands a day improved timed up and go (-3 sec) and 30s chair rise (+2) in sheltered housing residents

Harvey et al. In press.
Home Based Exercise Resources

• Home exercise booklets translated www.profound.eu.com
• In 14 EU languages
Support and Encouragement

A programme is more than a series of exercises

• Examples from successful falls and exercise programmes
• A range of strategies that support participants eg.
  – Goal setting and self monitoring
  – Overcoming obstacles and difficulties
  – Educating the participant
  – Highlighting successes
  – Providing individual and group support
• Those who have trained in motivational training for older people have better uptake and adherence to their sessions
Scaling up to reduce frailty and falls?

• Work effectively with those in transition - Frailty and falls
  – Safe and effective exercise for those in transition and those who are frail
  – Transitions and progressions
  – Qualified trainers who understand tailoring/adaptation for multiple conditions, progression and challenge needed, trained to support motivation to adhere and transition on

• Change cultural ‘norms’! – sit less, move more

• Involve older people in engaging other older people
Older people as role models and mentors – ‘someone like me’
Scaling up to reduce frailty and falls?

• All ‘contacts’ with older people need to reinforce the move more often message
  – Move more often and improve your strength and balance
  – Let’s stop compounding the problem by not taking every opportunity (eg. Hospital wards and care homes!)
• Raise awareness of physical activity guidelines
  – Amongst professionals and older people!
• Increase opportunities for primary prevention
  – Effective improvement of strength and balance in all settings
  – Map out what’s there and where people can access this
“Life in your years”

- requires more than just stamina and energy, requires strength and balance to feel confident in all other activities you go on to do.... It's never too late!
Questions?

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http://www.gcu.ac.uk/seniorsusp/  http://profound.eu.com/