Improving activity levels in older adults improves clinical outcomes

Professor Dawn Skelton
Presentation Aims

• Benefits of physical activity irrespective of age or medical condition
• Exercise and falls prevention
• Importance of falls per unit of activity
• Sedentary behaviour and frailty/sarcopenia
• Consistent messages to change behaviour from the whole team!
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...
Isometric Quadriceps Strength

Strength to be confident of rising from low chair without using arms

Skelton et al.  
ADNFS  
(1999)

N=1318  
Nationally representative
3 Dimensions of Human Frailty

DISEASE

TIME

HUMAN FRAILTY

DISUSE

Spirduso, 1995
Do we know our own abilities?

• We lose strength/balance from about age 30!
• When is strength/balance not good enough?

• STAND UP 😊

• Window of opportunity to intervene.....
Where does it all fit?

Engaged in life

Purpose, meaning and occupation

Any bodily movement

Planned Structured Repetitive

Philosophy, purpose, skills, outcomes and prejudices
Physical Activity Guidelines for Older Adults

Canadian Physical Activity Guidelines

**Guidelines**

To achieve health benefits, and improve functional abilities, adults aged 65 years and older should accumulate at least 150 minutes of moderate-to-vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more.

It is also beneficial to add muscle and bone strengthening activities using major muscle groups, at least 2 days per week.

Those with poor mobility should perform physical activities to enhance balance and prevent falls.

More physical activity provides greater health benefits.

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**Let's Talk Intensity!**

Moderate-intensity physical activities will cause older adults to sweat a little and to breathe harder. Activities like:

- Brisk walking
- Bicycling

Vigorous-intensity physical activities will cause older adults to sweat and be out of breath. Activities like:

- Cross-country skiing
- Swimming

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**Being active for at least 150 minutes per week can help reduce the risk of:**

- Chronic disease (such as high blood pressure and heart disease) and,
- Premature death

And also help to:

- Maintain functional independence
- Maintain mobility
- Improve fitness
- Improve or maintain body weight
- Maintain bone health and,
- Maintain mental health and feel better

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**Pick a time. Pick a place. Make a plan and move more!**

- Join a community urban poling or mall walking group.
- Go for a brisk walk around the block after lunch.
- Take a dance class in the afternoon.
- Train for and participate in a run or walk for charity.
- Take up a favourite sport again.
- Be active with the family. Plan to have "active reunions".
- Go for a nature hike on the weekend.
- Take the dog for a walk after dinner.

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CSEP, 2012

DOH, 2011
Chart 2
Proportion of adults aged 18 to 79 meeting the Canadian Physical Activity Guidelines,¹ by age group and sex, Canada, 2012 and 2013

percent

- Use with caution (data with a coefficient of variation from 16.6% to 33.3%)
- Too unreliable to be published (data with a coefficient of variation (CV) greater than 33.3%; suppressed due to extreme sampling variability)

1. According to the Canadian Society for Exercise Physiology, adults should accumulate at least 150 minutes of moderate-to-vigorous activity in periods of at least 10 minutes per week.

Physical activity benefits for adults and older adults

+ BENEFITS HEALTH
ZZz IMPROVES SLEEP
平稳 MAINTAINS HEALTHY WEIGHT
 ElseIf MANAGES STRESS
平稳 IMPROVES QUALITY OF LIFE

<table>
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<th>REDUCES YOUR CHANCE OF</th>
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<tr>
<td>Type II Diabetes                                          -40%</td>
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<tr>
<td>Cardiovascular Disease                                    -35%</td>
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<tr>
<td>Falls, Depression and Dementia                            -30%</td>
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<tr>
<td>Joint and Back Pain                                       -25%</td>
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<tr>
<td>Cancers (Colon and Breast)                                -20%</td>
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What should you do?

For a healthy heart and mind  To keep your muscles, bones and joints strong  To reduce your chance of falls

Be Active  Sit Less  Build Strength  Improve Balance
Achieving activity guidelines

- Sedentary
- Moving
- Moving More Often
- Moving regularly and frequently
- Meeting the guidelines

Increased physical activity

Increased benefits
Exercise Benefits

• >3 hrs per week targeted exercise
  – Heart Attack - 3 x less likely
  – Osteoporosis - 2 x less likely
  – Hip fracture - 2 x less likely

• CHD and Stroke
• Osteoporosis
• Type II Diabetes
• Hypertension
• Improved sleep
• Depression and anxiety
• Obesity and overweight
• Colon and other cancers
• Reduction in accidental injuries
• Improved cognition

Acute effects of exercise

- 24-48 hr period after exercise
  - Glucose tolerance
  - Insulin sensitivity
  - Circulating growth hormone
  - Reduced cortisol
  - Cerebral circulation and function

- Absorb bone medications better
- Less likely to be Vit D deficient
Physical Activity benefits....

• Psychological
  – Reduce Anxiety, depression, fear of falling; Improve sleep

• Physiological
  – Maintain bone density, ability to perform everyday activities, reduce breathlessness and stiffness; reduce effects of disease and falls

• Psychosocial
  – Reduce Isolation, Increase self efficacy, social contacts, peer support, playing with grandchildren, using the bath

• Even the very frail
  – DVT, constipation, transfer skills
Interpreting the guidelines
BHFNC Resources

The Actives

In Transitions

Frailer, older people
“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.... Its never too late!
"Just like the Olympic athlete, the elderly person must perform, frequently and consistently, at the very limit of their physical ability. The 85-year-old can therefore benefit from the study of athletic training methods..."

(Professor Archie Young, 1997)
Strength and balance

• A 12 week high Intensity Strength Training programme in >90 yr olds **doubled their strength**

• In 3 months a 65-90 year old can **rejuvenate 20 years of lost strength**

• **Balance requires CHALLENGE!**
  – Standing or moving about whilst standing and
  – Reduced base of support
  – Movement of centre of mass
  – Reduced holding

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


Exercise Type ?
Exercise Intensity ?
Exercise Approach?
How often?
How long for?
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, NSPHB 2011
Kendrick Cochrane Review FoF 2014
Cost effectiveness research hampering implementation?

• There is some evidence that a home-based exercise programme can be cost saving within one year in over 80’s and group exercise is cost effective for over 65’s.
• similarly home safety assessment and modification in those with a previous fall,
• and one multi-factorial programme targeting eight specific risk factors.

Gillespie et al. Interventions for preventing falls in older people living in the community. Cochrane Library 2012
Wide range of abilities and needs
Effective Falls prevention exercise

• Different programmes for different populations
  – Primary prevention – Tai Chi, FaME etc.
  – Secondary Prevention – Otago, FaME etc.

• Some exercise ineffective
• Some exercise unsafe

Overall (I-squared = 61.5%, p = 0.000)

Favours exercise
Favours control

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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)
Is it possible to increase activity without increasing falls?

6 months of FaME in low risk older adults? Still effective?

**FaME increased moderate to vigorous physical activity by 15 mins/day.**
Up to 12 months post intervention.
**By 24 months effect discontinued.**

**FaME reduced falls by 26% (IRR 0.74)**
Up to 12 months post intervention.
**By 24 months effect discontinued.**

No increase in falls at beginning of intervention

Iliffe S et al. *Health Technology Assessment* 2014
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)
Question to you....

- Please all stand up...

- Sit down if you are NOT involved in delivery or referral to exercise to prevent falls....

- Does the exercise intervention really progress strength training and challenge balance (most of session in standing)? Sit down if not....

- Sit down if the exercise intervention is less than 50 hours in length
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

FALLS REHABILITATION GROUP

‘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

Falls...Sarcopenia...Frailty...Physical & Psychological Health...Isolation...Inclusion...Social Engagement...Independence...Quality of Life...Health & Social Care costs...

Community Exercise Sessions (Otago/FaME/Other)  GP / Exercise Referral  Tai Chi  Dance  Walking Groups
Table Task

List 3 activity/exercise opportunities within a 15 minute walk/30 min drive (from) that includes strength and balance work within the programme and .....  

- Has an experienced/qualified/empathetic teacher/instructor/leader  
- Is at a sustainable price?  
- You are confident to recommend

How do you know?

If you can’t think of any – how are we going to change this?
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
Table Task:

What do you think are the main reasons that older people avoid activity, or don’t take part in exercise?
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)
Intrinsic barriers

- *What we think, our perceptions, beliefs, attitudes towards physical activity eg*
  - “I’m too old, it’s too late to start”
  - “It won’t make any difference, have any effect”
  - “I might hurt myself, make things worse”
  - “I hated playing sport when I was young”
  - “I couldn’t do that it’s too difficult”
Programme barriers

- *Are about the exercise experience*
- Inconvenient (time, place, cost)
- Challenge (too easy, too hard)
- Limited choice – rather do something else
- Prefer to exercise with someone else
- Not clear about the tasks – am I doing it right?
- Lack confidence in the skills of the leader
Extrinsic barriers

- Impact of the physical, cultural and social environment
- Absence of safe walking environments (parks and open spaces, well-lit streets)
- Negative attitudes of others, e.g. Medical practitioner, care givers
- Lack of support from partner, family and friends
- Few positive images and older people to provide role models as the norm.
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

A simple guide to strength and balance for you to...

...KEEP ON WALKING

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.

A set of simple exercises for older adults who want to live life to the full!
Falls prevention must be more than strength and balance

- Some people compensate by being less physically active because they are doing strength and balance exercise (e.g., Visually impaired older adults)

- We have to have the conversation – these exercises have to be in addition to moving more often...

- Sedentary behaviour leads to poor outcomes

Waterman et al. 2016; Dogra et al. in press, 2016
Sedentary Behaviour
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)
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)
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 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

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

Table Task

• Stand up and talk to the person to your right side

• One idea on how to break up long periods of sitting (>1 hour) in your work setting?

• One idea on how to break up long periods of sitting (>1 hour) in the older people you work with?
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.
More falls in home exercise group than in the control group
Performance based mobility improved more in the intervention group than the control group

More falls just because increased activity (exposure to risk?)
Is this still a bad outcome?
Start simple - One leg stand!

- 6 months, single leg stand for 1 min per leg 3 x per day
  - Improved bone density
  - Improved balance
  - Improved leg strength!

J Bone Min Metab 2009 - Sakai et al
Sit to Stands – a marker of frailty

Use of hands to rise from a chair is strongly related to all cause mortality (taking into account age, body mass index and gender)

Reduction in risk:
- Unable to rise
- Use of two hands to rise
- Use of one hand to rise
- No hands to rise

Home Exercise Booklets

- Home exercise booklets translated
  [www.profound.eu.com](http://www.profound.eu.com)
- In 14 EU languages
Physical Activity Literacy Model

“the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life”

Highlighted in the Canadian Life Long-term Development Model
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
Practical opportunities to intervene

- Referral and Assessment
- Listening and talking
- 1st experiences and induction
- Target/goal setting
- Feelings Achievements and Rewards
- Educational opportunities
- Support Strategies

- Those who have trained in motivational training for older people have better uptake and adherence to their sessions
Build positive attitudes to strength and balance training

• Emphasise the benefits of positive interventions
• Don’t just focus on how falls can be prevented
• Emphasise the effects that are meaningful and important (eg. improved mobility, confidence)
• Emphasise potential life-changing benefits, (eg. maintain independence, play with the grandchildren, live life to the full)

(Yardley et al 2006)
It’s never too late

- A 12 week Strength Training programme in 90+ year old nursing home residents doubled their leg strength *(Fiatarone, 1990)*

- Over 75s rejuvenated 20 years of lost strength in 12 weeks of seated strength exercises *(Skelton, 1995)*

- High Intensity Functional Exercise for Care home residents with dementia (12 wks) improved strength, balance and ADLs *(Littbrand, 2011)*
Consistent Messaging – why balance training?

- If you avoid activities that make you feel ‘wobbly’ you will get more ‘wobbly’
- You can only improve balance if you do things that make you feel ‘wobbly’
  - so that your brain and body practice at keeping you upright
- Practice makes perfect
  - Standing on one leg for 3 mins per day for 6 months not only improves balance but also bone density at the hip (if you are over 70!)
Consistent Messaging – why do we need strength?

• We need strong muscles to
  – Maintain independence
  – Play with our grandchildren
  – Care for someone
  – Fight infection
  – Protect our joints and bones
  – Protect our brains and memory
  – Stay warm

• Pain is NEVER good but muscle discomfort after exercise is 😊

• Need to continue….. Use it or lose it!

Acknowledgment: John Sheerin
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
We need it to be **socially and culturally normal** for older people to move more often.

We all need to **believe that older people benefit from moving more often**

**Older people (& family/gatekeepers) need to believe they will benefit from moving more often**

We need to stop **wrapping older people up in cotton wool**

We need to involve older people who have benefitted from rehabilitation to **help us empower other older people**
Questions?

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