WHAT IS THE ROLE OF EXERCISE IN PREVENTING FALLS AND FRACTURES IN LONG-TERM CARE?

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ABOUT ME...

• Registered physiotherapist

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• Worked in LTC

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• Research focus: improving rehabilitation across the continuum of care

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OBJECTIVES:

- 1) discuss current evidence for the role of exercise to prevent falls and fractures in LTC

- 2) present practical solutions for putting evidence about fall and fracture prevention into practice in long-term care homes

- 3) examine ways to modify suggestions for different physical and cognitive abilities.
LONG-TERM CARE (LTC)

- 625 licensed LTC homes in Ontario:
  - 77,477 long-stay beds, 617 convalescent beds, 355 respite beds

- 7.1% of older adults over the age of 65 live in specialized care facilities, like LTC

- The Ontario government has plans to add 5000 more LTC beds over 4 years
RESIDENTS IN LTC OFTEN HAVE:

- Complex co-morbidities
  - 25.0% have diabetes, 4.4% have chronic obstructive pulmonary disease, 21.2% have experienced a stroke

- Physical impairments:
  - High prevalence of sarcopenia

- Cognitive impairments:
  - More than 80% of residents in LTC have some degree of cognitive impairment
  - 56.3% of residents have a diagnosis of Alzheimer’s or other dementias

- Activity limitations:
  - 95% of residents require some assistance with activities of daily living (ADLs)
  - More than 80% require extensive care
  - On average spend three quarters of their waking time in sedentary activities
FALLS IN LTC

- 1.5 falls per bed per year – 3x rate in community
- Significant consequences:
  - functional disability
  - Fractures
  - Pain
  - reduced quality of life
  - death
- 25% of residents hospitalized after a fall die within 1 year

Ooms et al. Osteoporos Int. 1994;4(1):6-10
Residents are at risk for fractures because of:

- Age-related bone loss
- Increased risk of falling
- Altered mechanics of falls

Hip fractures:

- 49% of all fractures in LTC
- 1.6-2.2 times higher for LTC residents
- One of the leading causes of hospitalization
- Associated with increased mortality, worse mobility and quality of life
- ~50% of residents who have a hip fracture die or develop total dependence within 6 months

THE CASE FOR STRENGTH AND BALANCE TRAINING

- Common activities that precede falls:
  - Weight shifting
  - Walking
  - Transferring

- LTC residents spend 75% of their waking time in sedentary activities and have a high prevalence of sarcopenia

- Challenging balance training and resistance exercise are well-known intervention for reducing falls and improving muscle strength for community dwelling older adults
THE EVIDENCE FOR STRENGTH AND BALANCE TRAINING

- **2012 Cochrane review:**
  - the evidence surrounding exercise to prevent falls in LTC was inconsistent and did not demonstrate an overall benefit.
  - exercise programmes may increase the risk of falling for frailer residents, but reduce the risk of falling for less frail residents.
  - interventions targeting multiple risk factors may be effective – specifically gait, balance, and functional training

- **2013 systematic review by Silva et al.:**
  - combined exercise programs (i.e., multiple types of exercise) that include balance tasks, are completed frequently (2-3 times per week), and over a long-term (greater than 6 months) were most effective at preventing falls.
THE EVIDENCE FOR STRENGTH AND BALANCE TRAINING

- 2015 umbrella review by Stubbs et al.:
  - multifactorial interventions were the most effective at preventing falls in LTC

- 2015 recommendations for fracture prevention in LTC:
  - balance, strength, and functional training should be included for residents who are not at a high risk of fracture, while for those at high risk, exercise should be provided as part of a multifactorial falls prevention intervention.

- 2016 systematic review by Sherrington et al.:
  - there was no evidence that exercise as a single intervention can prevent falls for residents in LTC.
Progressive Resistance and Balance Training for Falls Prevention in Long-Term Residential Aged Care: A Cluster Randomized Trial of the Sunbeam Program

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individually prescribed progressive resistance training plus balance training

Group setting

2x/week, 1 hour session for 25 weeks – followed by a maintenance program for 6 months

Results:

- Decreased falls (142 vs. 277) and fall rate (1.31 vs. 2.91 falls per person-year)
- Similar number of fall related fractures between groups (5 vs. 6)
- Participants who attended more than 30 hours of training saw improvement in falls outcomes

THE EVIDENCE FOR STRENGTH AND BALANCE TRAINING

**Static standing balance**
1. Bicep curl (with resistance bands) (3 x 10)
2. Shoulder retraction (with resistance bands) (3 x 10)
3. Standing feet together (progress to semi-tandem than tandem) 3 x 30 seconds

**Dynamic standing balance**
4. Heel raises (2 x 6)
5. Toe raises (2 x 6)
6. Recovery steps (*)
   (1 x 10 each side and behind)
7. Reaching outside base of support (10 x each side)
8. Grapevine steps (holding groups leaders’ hands)

**Holding back of chair/table with 2 hands**
**Holding back of chair/ table with 1 hand**
**Not holding on**

**TRIGGER FOR PROGRESSION:** Participant reported perceived exertion was “somewhat easy”

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**Other progressions of for static exercises**
- Eyes open
- Eyes closed
- Count backwards from 50 by intervals of 5
- Increase heel/toe raise exercises to 2 x 10

**TRIGGER FOR PROGRESSION:** Participant reported perceived exertion was “somewhat easy”

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**Progression for dynamic exercises**
- Increase speed of recovery steps and grapevine
- Increase repetition
- **TRIGGER FOR PROGRESSION:** Participant reported perceived exertion was “somewhat easy”

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**Fig. 2. Balance exercises and progression schedule used in stage 1.**


**THE EVIDENCE FOR STRENGTH AND BALANCE TRAINING**

**Fig. 1.** Resistance exercises and progression schedule used in stage 1.
MULTIFACTORIAL FALLS PREVENTION PROGRAMS

- staff and resident education
- environmental modifications
- supply/repair/provision of assistive devices
- falls problem-solving conferences
- urinary incontinence management
- medication review
TO CHANGE MUSCULAR STRENGTH, EXERCISES NEED TO BE:

- **Challenging:**
  - one to two sets of 6 to 8 repetitions before being fatigued
  - Residents who are particularly deconditioned may need to begin with lower intensity strength exercises (e.g., only do one set, with a lower resistance and progress to a higher resistance)

- **Progressive:**
  - Progression could include increasing the number of sets (e.g., increase from one to two sets), the resistance (e.g., holding dumbbells while squatting), or the intensity of the exercise (e.g., squat lower or faster)
EXAMPLE STRENGTH EXERCISES

1. External resistance
2. Body weight
“...the efficient transfer of bodyweight from one part of the body to another or challenges specific aspects of the balance systems (e.g., vestibular system)” (http://www.profane.eu.org/taxonomy.html)
EXAMPLE STATIC BALANCE EXERCISES

1. reducing the base of support
2. standing without using arms for support or reducing reliance on the upper limbs for support
3. moving the centre of gravity and control body position
EXAMPLE DYNAMIC BALANCE EXERCISES

https://carehometoday.co.uk/older-people-arthritis-need-45-minutes-exercise-per-week-maintain-mobility/

Most effective at reducing falls:
- two to three days per week
- over a period of more than six months

Consider:
- the residents’ preferences
- the social benefits of group exercise
- the feasibility of individualizing exercises for the complex needs of residents in large group settings
STANDING OR SITTING??

- Standing as often as possible and where appropriate
  - Facilitates carry over of strength gains into functional tasks

- A recent study, comparing standing versus seated exercises for community dwelling older adults, saw greater functional gains for those who completed the standing exercises

STANDING OR SITTING?
MODIFICATIONS FOR PHYSICAL IMPAIRMENTS

http://www.gerascentre.ca/ltc-series
SUMMARY

- Incorporate strength and balance exercises as part of a multifactorial falls prevention program.

- Balance exercises should be challenging and dynamic.

- Strength exercises should be of a moderate to high intensity (e.g., can complete one to sets of 6 to 8 repetitions) and progressive.

- Two or three days per week, for 30 to 45 minute sessions, for at least 6 months.

- Exercises in standing should be prioritized where appropriate.

- Group or individual - consider the preferences, social benefits, and the feasibility.

- Consider and modify for physical and cognitive impairments.

THANK YOU!

QUESTIONS?

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