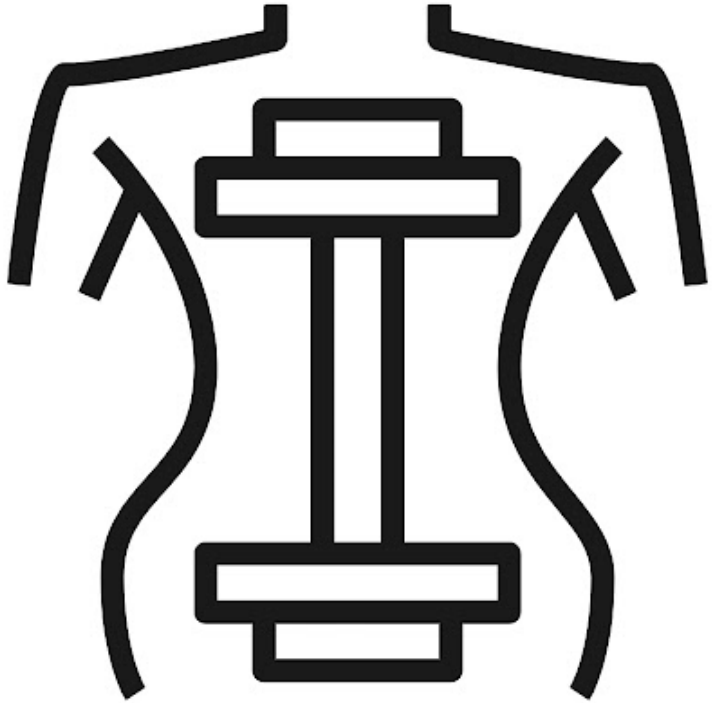
Canada's New Osteoporosis Guideline: Fracture and Fall Prevention



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CANADIAN MEDICAL ASSOCIATION JOURNAL

Update of the 2010 guideline
25 Recommendations
10 Good Practice Statements

- Exercise
- Nutrition
- Fracture Risk Assessment & Treatment Initiation
- Pharmacologic Interventions
- Duration & Sequence of Therapy
- Monitoring

Guideline CPD

Clinical practice guideline for management of osteoporosis and fracture prevention in Canada: 2023 update

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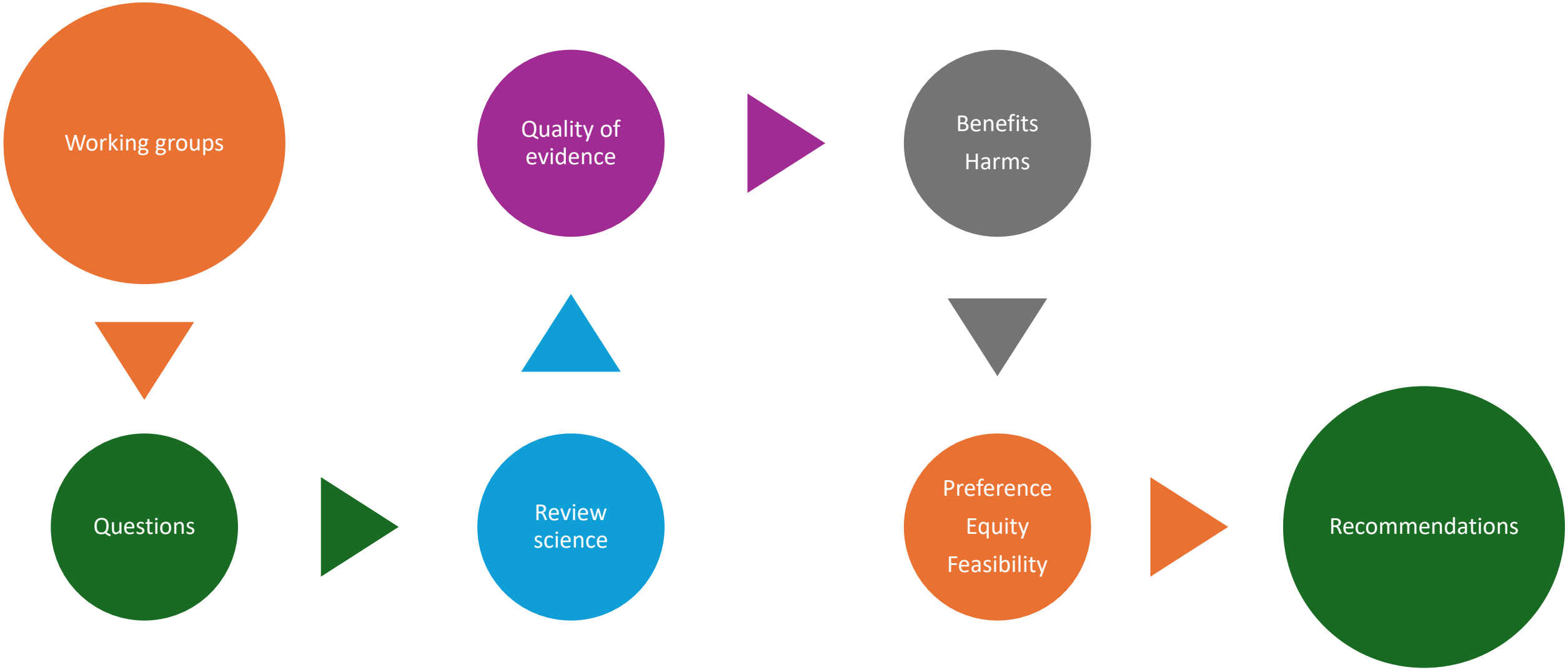
How did the guidelines get developed? GRADE process

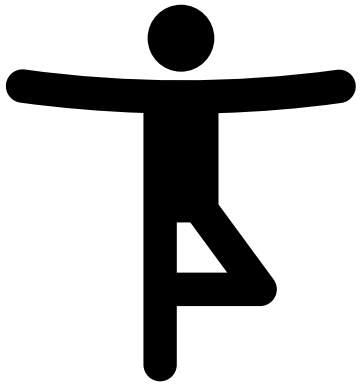


Strength of Recommendations

Strong Recommendation	Conditional Recommendation
Benefits ***clearly*** outweighs harms in most settings. Recommend to **almost all patients**. Thorough review of evidence and detailed discussion unlikely to be needed to help with patient decision making.	Benefits ***probably*** outweighs harms in most settings. **Different choices will be appropriate for each person**. Discuss evidence, person's values and preferences to help with patient decision making.
We recommend …	**We suggest …**

Exercise recommendations: Evidence

What types of exercise prevent fractures?



Gait, balance, co-ordination, or functional training can prevent falls (high certainty) and may prevent fractures (low certainty)

↓ fall-related fractures by 56% compared with control (95% CI 0.25 to 0.76); 2139 participants, 7 studies, low-certainty evidence

?

Effects of other types of exercise e.g., walking, Tai Chi, resistance training, multimodal, are uncertain.

Sherrington C et al, Cochrane Database of Systematic Reviews 2019

What types of exercise prevent falls?

Multicomponent (balance, functional, resistance):

↓ rate 34%, ↓ risk 22%, moderate certainty

Balance and functional training:

↓ rate 24%, ↓ risk 13%, high certainty

Tai chi:

↓ rate 19%, ↓ risk 20%, low/high certainty

Uncertain: Dance, Resistance exercise, walking

Sherrington C et al, Cochrane Database of Systematic Reviews 2019

Resistance and impact exercise may improve bone mineral density (low/very low certainty).

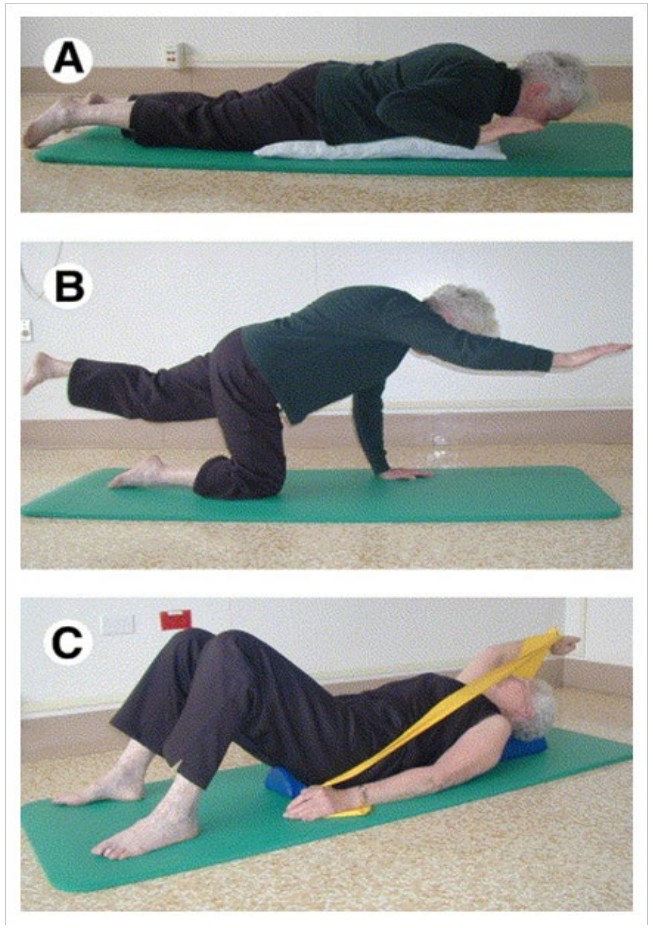
Include exercises to improve posture if that is a goal for you.

Effects of Exercise on BMD in People at Risk of Fracture

Activity	Change in Hip BMD, g/cm^2 (95%CI, certainty)	Change In Spine BMD, g/cm^2 (95%CI, certainty)
Impact - combo (2 studies, n=174, 5 studies)	FN 0.04 (0.02, 0.07, low)	0.03 (0.01, 0.05, low)
Impact alone (2 studies, n=104, n=117)	FN not estimable TH 0.04 (0.01, 0.07, low)	0.04 (0.02, 0.06 low)
Walking (1 study, n=97, 1 study, n=139)	FN 0.01 (0, 0.03, low)	0.02 (0, 0.03, low)
Resistance training – combination (5 studies, n=521, 4 studies, n=435, 4 studies, n=209)	FN 0.02 (0.01, 0.03, very low) TH 0.00 (0.00, 0.01, very low)	0.02 (-0.01, 0.05, very low)
Resistance training only (2 studies, n=183)	FN 0.03 (0, 0.05, very low) TH 0.01 (-0.02, 0.05, very low)	Not estimable
Balance and functional training (2 studies, n=123)	FN 0 (-0.03, 0.02, very low)	Not available
Pilates (1 study, n=21)	Not estimable	0.06 (0.01, 0.11, very low)
Yoga (3 observational studies)	Not estimable	Not estimable

FN = femoral neck, TH = total hip, BMD=bone mineral density

Figure 1. Spinal extensor muscle strengthening
A: prone trunk extension; B: quadruped arm/leg lift; C: supine theraband arm flexion and extension



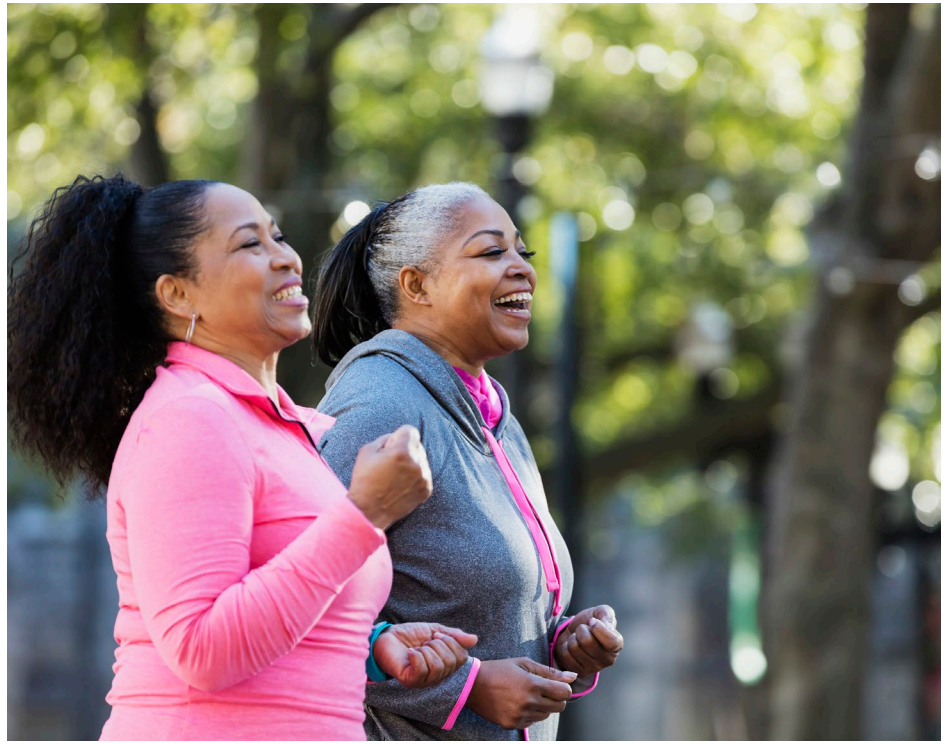
Exercise in Individuals with Hyperkyphosis

Outcome	Effect Estimate (95% confidence intervals)	Certainty
Back extensor strength	MD 10.51 N (6.65, 14.38)	Very low
Back extensor endurance	MD 9.76 s (6.40, 13.13)	Low
Kyphosis outcome	SMD -0.31 (0.46, -0.16)	Moderate
HR QoL	SMD 0.21 (0.06, 0.37)	Moderate
Timed up and Go	MD -0.28 s (-0.48, -0.08)	Very low
Pain	MD -0.26 (− 0.39, − 0.13)	Low
Falls	IRR 1.29 (0.95, 1.74)	Low

MD = mean difference

Ponzano et al, Archives of Osteoporosis, 2021

Many exercise modes may improve physical functioning or quality of life (very low/ low/moderate certainty).



Serious adverse events associated with exercise seem to be rare.

Muscle soreness or minor injuries can occur.

Key points from systematic reviews of exercise in people at risk of fractures:

- Balance and functional training, with or without resistance training can prevent falls (high certainty) and may prevent fractures (low certainty);
- Resistance and impact exercise may improve BMD (low/very low certainty); include exercises to improve posture if that is a goal;
- Many exercise modes may improve physical functioning or quality of life (very low/low/moderate certainty);
- Adverse events seem to be rare

Exercise Recommendations

We recommend balance and functional training ≥ twice weekly to reduce the risk of falls.

Strong recommendation; moderate-certainty evidence

Exercise Recommendations

We suggest progressive resistance training ≥ twice weekly, including exercises targeting abdominal and back extensor muscles.

Conditional recommendation; low-certainty evidence

Exercise Recommendations

We suggest that people who want to participate in other activities for enjoyment or other benefits be encouraged to do them*, if they can be done safely or modified for safety.

in addition to, but not instead of, balance, functional and resistance training

If participating in impact exercise, progress to moderate-impact or high-impact exercise only if appropriate for fracture risk or physical fitness level; Conditional recommendation; very low-certainty evidence

Good Practice Statements

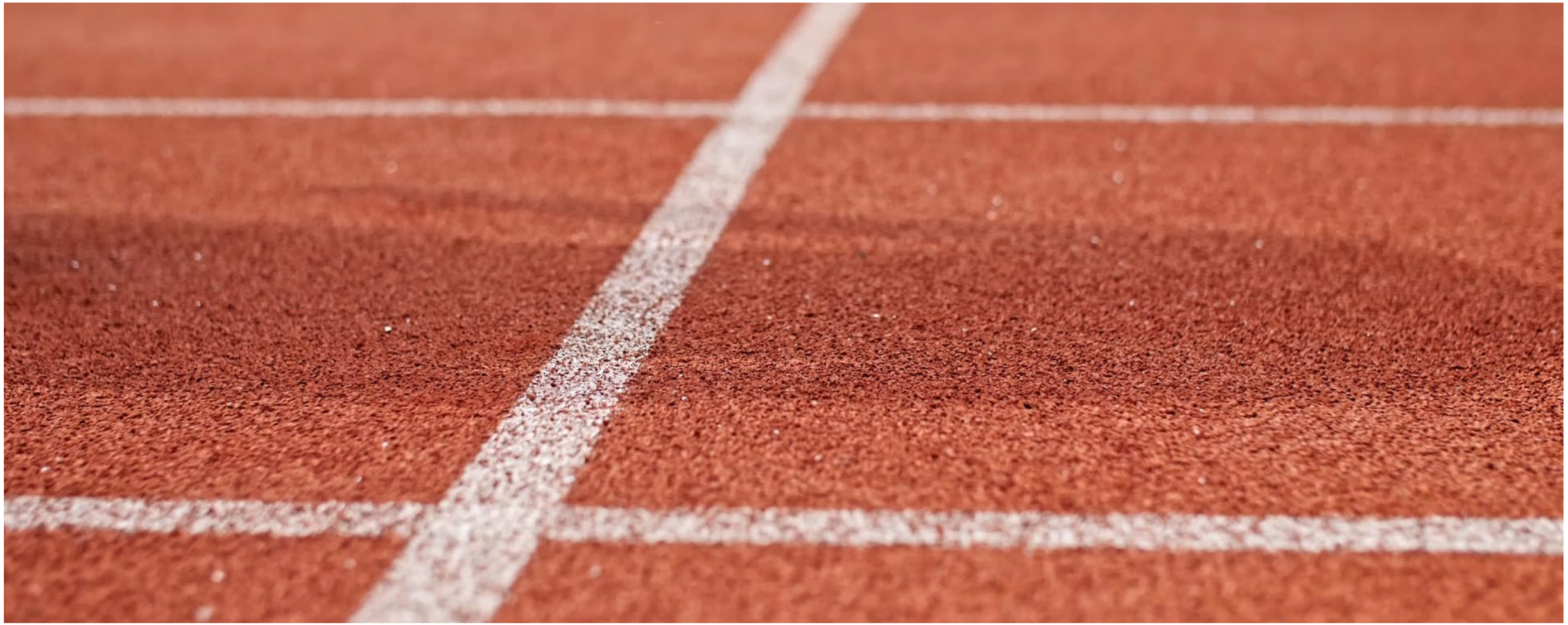
Activities that involve rapid, repetitive, sustained, weighted or end range-of-motion twisting or flexion of the spine may need to be modified, especially in people at high risk of fracture.

When available, seek advice from exercise professionals who have training on osteoporosis for exercise selection, intensity and progression, and activity modification, especially after recent fracture or if there is high risk of fracture. When not available, refer to Osteoporosis Canada resources.

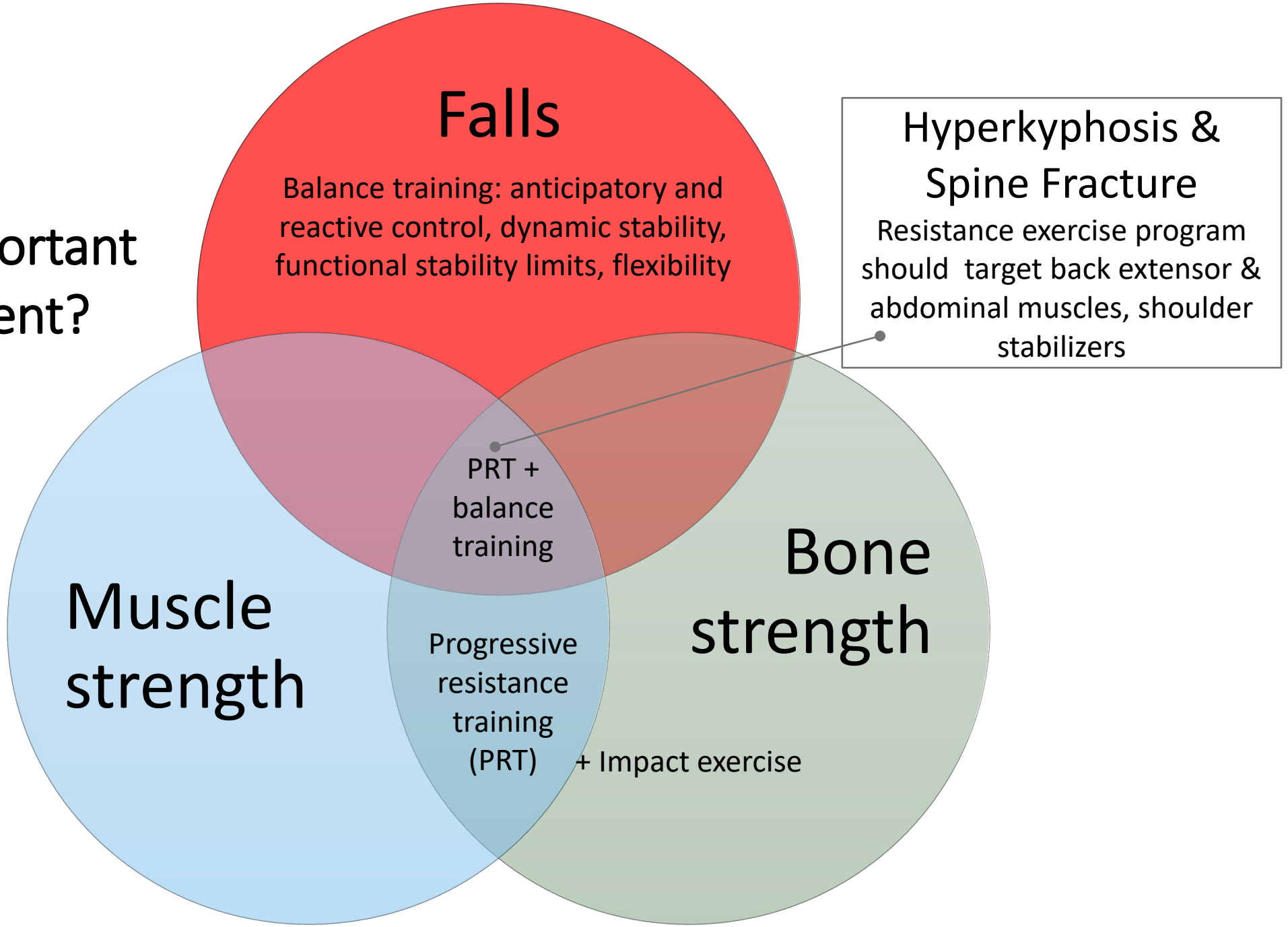
Exercise for fall and fracture prevention

- **We recommend balance and functional training at least twice a week.**
- **We suggest strength training at least twice a week.**
- Do other activities for fun or fitness in addition to, but not instead of, balance, functional and strength training
- Some movements may need to be modified or avoided, especially if high risk
- When available, seek advice from exercise professionals who have training on osteoporosis

Putting the exercise recommendations into practice



What is important for the client?



Balance training ≥ twice per week:
What types of balance training are most effective?

Anticipatory control:

Proactively adjust body position or movement before making a movement that might cause instability

Dynamic control:

Have control of centre of mass position when changing position

Functional stability limits:

Move centre of mass as far as possible in any direction, stay stable

Reactive balance control:

Ability to re-establish stability in face of internal or external instability

Sibley et al, Exp Gerontol, 2021

Example Balance Exercises:

Anticipatory control and dynamic stability	Heel raises, walk on toes or heels, toe taps on a step, Clock Yourself app, Agility ladder, lateral hops, shrimp squats, step-ups
Functional stability limits	Reaching or weight shifting in all directions standing or on one foot, one or two-legged hinge or Romanian deadlift, hip airplanes
Reactive control	Moving while standing on unstable surface Catching and throwing a ball External push/pull on part of body while doing activity

Resistance training ≥ twice per week: Start with one exercise per category

PUSH: chest and arms

PULL: upper back and arms

SQUAT: upper legs and lower legs

HINGE: upper legs and lower legs

CARRY: whole body, including abdominals and back extensors, and forearm muscles

REACH or PRESS: arms, shoulders, upper back

Example approach: Pick one exercise per category

Movement	Beginner	Moderate	Hard
Push	Wall push-up	Counter push-up	Floor push-up Bench press
Pull	Elastic band row	Supported dumbbell row, band row, lat pull	Pull-up
Squat	Sit-to-stand	Bodyweight squat	Goblet or back squat
Hinge	Bridge	Hip hinge with resistance band or kettlebell	Deadlift
Carry	Farmer’s carry	Suitcase carry	Bottom’s up carry
Reach/ Press	Elastic band press	Landmine press	Pike push-up, overhead press

How to design a resistance training program

≥ 2x /week, 2 sets per exercise

Pick a version you can do 6-10 times, but it feels hard. Practice form first.

Progress to a version of the exercise where you can do 6-10 reps but requires **high effort**

Lower for 4 seconds, lift for 2 seconds.

Progress:

Reps→ to 12

Sets → to 3-5

Then choose a harder version of the exercise

https://www.instagram.com/p/Cz1JComPIuz/?utm_source=ig_web_copy_link&igshid=MzRlODBiNWFlZA==

Instagram: meghancalloway

Is improving posture a goal?

Include exercises for back extensors, abdominal muscles, and shoulder stabilizers.

Back extensors and abdominals:

Work on endurance – lots of sets and reps, or longer golds

Shoulder stabilizers:

Include presses, pushes, and pulls as part of strength training program

Add extra exercises to work on range of motion, external rotation if needed.

Targeting back extensor muscles

Supine lying 15-20min, 2-4x/day

Supine presses

Prone/seated trunk extension w pillow

Standing or counter arm and leg raises

Quadruped arm and leg raises

Deadbug

Resisted thoracic extension

Supine lying, with gentle press of shoulders into floor

Quadruped alternate arm and leg raise aka Bird-dog

Video of Bird-dog here: https://youtu.be/eLbUNcZz-nI

Scenario: Choosing exercises for someone with hyperkyphosis

- Query health history re: fixed hyperkyphosis: ankylosing spondylitis, vertebral fractures etc.
- Avoid too much weight in front of body
- Use pillow for supine exercise to maintain neutral cervical spine positioning
- Shoulder internal rotation – how to modify exercises?
- Strengthen hip extensors, address mobility of hip flexors
- Target back extensor muscles (including cervical extensors), and shoulder stabilizers

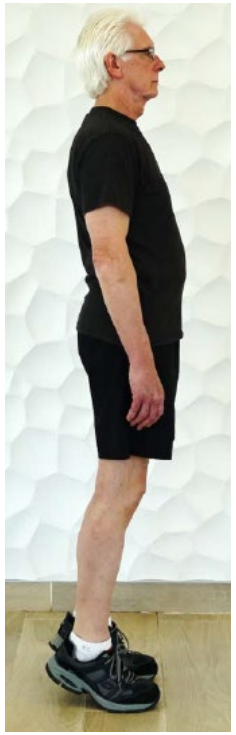
Scenario: Restricted shoulder external rotation

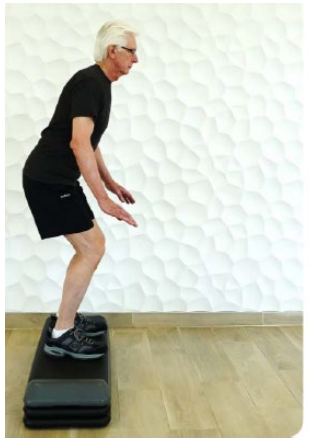
- Risk of impingement
- Back squat → safety bar, split squat
- Lat pull → half kneeling lat pull down, bent over dumbbell row
- Bench press → dumbbell press
- Shoulder press → landmine or incline press
- Accessory exercises:
  - External rotation strength (side-lying, face pulls with rotation)
  - Internal/External rotation mobility (e.g., slow eccentric)
  - Scapular retraction/protraction

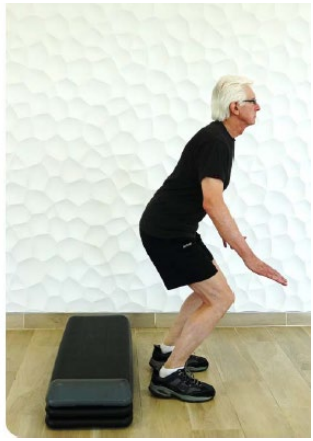
https://www.youtube.com/watch?v=GEmGEMSEeVQ&t=468s

What about impact exercise?

Start	Progression 1	Progression 2
a) Conditioning! b) Heel drops, foot stomp, grapevine c) Low-impact physical activity	Jump, low drop jump (soft landing) → jump squat, side hop, hop, skipping	Higher drop jump (soft knees), depth jump







- Studies demonstrating increased bone mineral density often combined resistance and impact training
- Strength training → low impact, increase speed, change direction, increase height
- If at high risk of fracture, or have arthritis, balance impairment: careful progression, or limit to lower impact, support object, use power training
- 3-5 sets, 10-20 reps, 1-2 min rest (ESSA Guidelines)

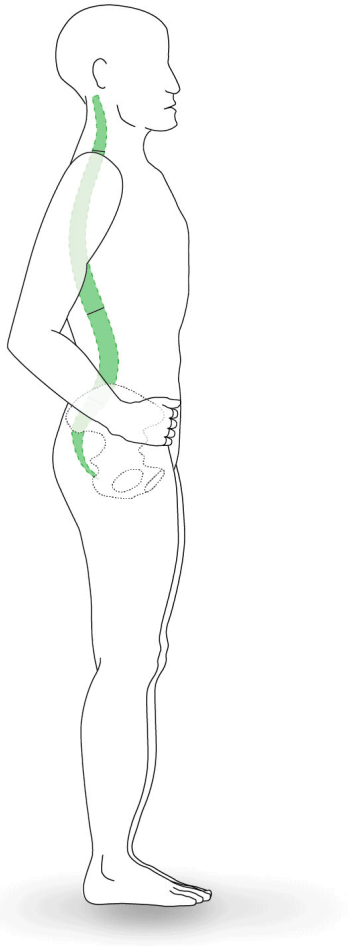
Do activities for fun or fitness if they can be done safely or modified. For some patients or some activities, the risk may outweigh the benefit.

DON'T: Avoid all bending and twisting

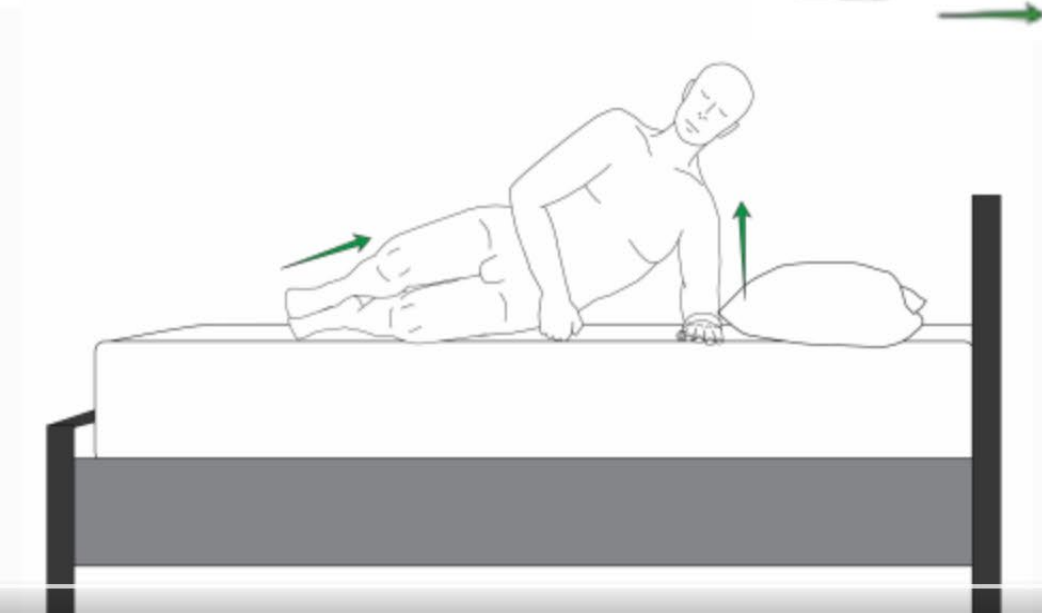
DO: Consider modifying/avoiding activities if you do not feel you can do them safely

High risk - may need to avoid/modify:

- Twisting spine quickly, over and over, or all the way.
- Bending spine forward quickly, over and over, or all the way.
- Combined spine twisting & bending.
- Twisting or bending the spine while holding something heavy.



Safe movement tips for people with osteoporosis.



Bend at hips, knees & ankles, not by rounding the back.

Hold things close to body or divide weight evenly in each hand.

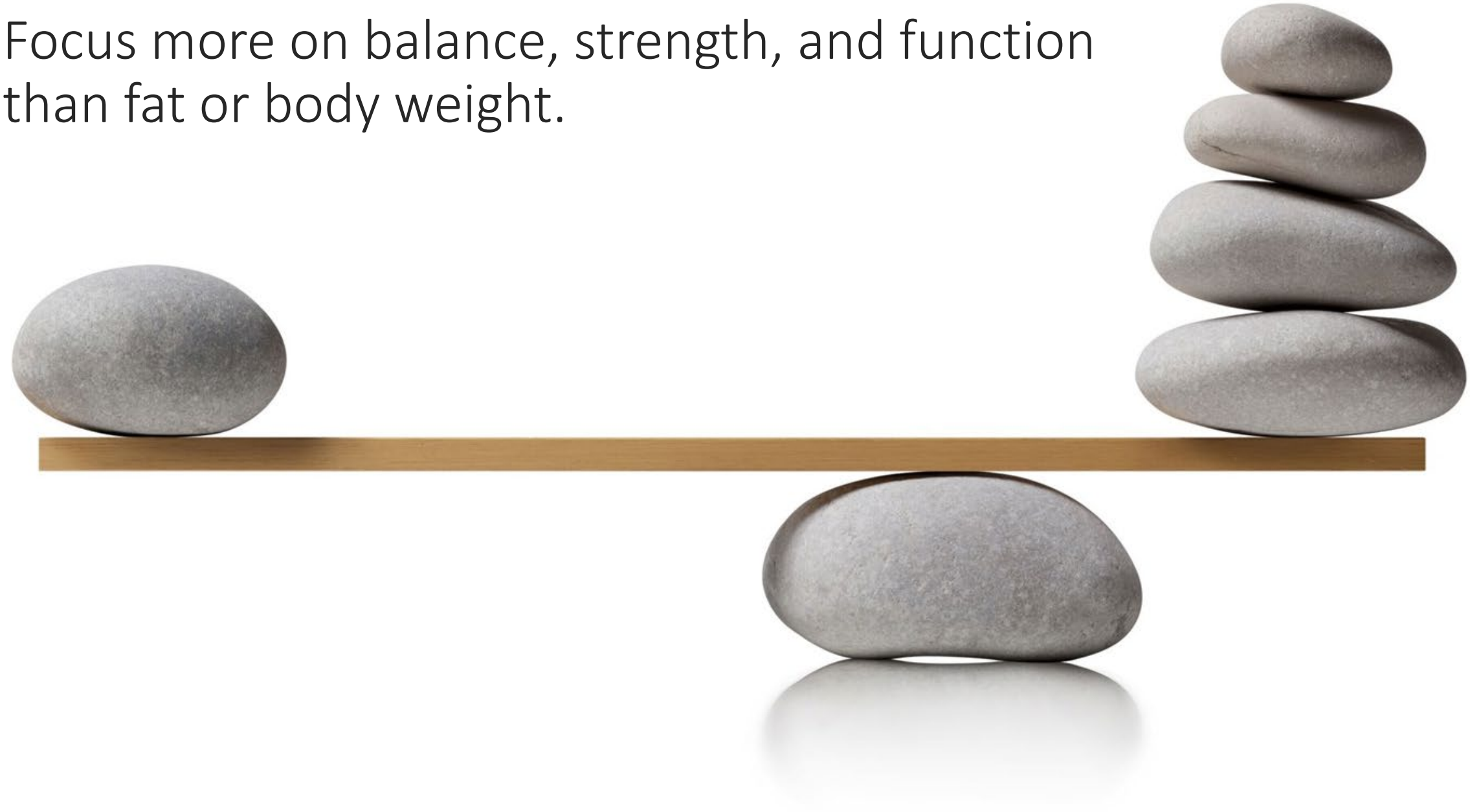
Use a log roll & arm strength to get out of bed.

Use a step-to turn to move around --> trunk, knees & toes face same direction.

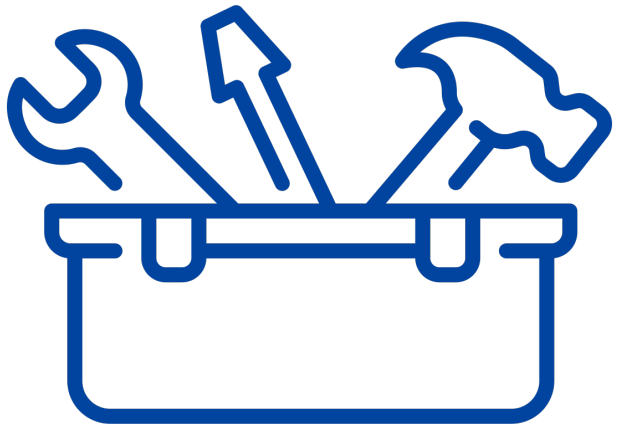
Use slow & controlled movements.

Look for resources from a national osteoporosis society, or see a physical or occupational therapist.

Focus more on balance, strength, and function than fat or body weight.



Identify a variety resources in your community or online.



- Osteoporosis Canada Too Fit To Fracture handouts and videos: https://osteoporosis.ca/exercise-recommendations/
- BoneFit™: https://bonefit.ca/bonefit-map-locator/
- Find a CSEP Certified Exercise Physiologist (CEP): https://csep.ca/membership-overview/directory/
- GLA:D™ Canada for arthritis: https://gladcanada.ca/how-to-participate-in-glad-canada/
- Otago Exercise Program for fall prevention (people at risk of falls): https://www.physio-pedia.com/Otago_Exercise_Programme
- Falls prevention exercise programs in community
- Tai Chi for fall prevention

Summary

We recommend balance and functional training at least twice a week.

We suggest strength training at least twice a week.

Do other activities for fun or fitness in addition to, but not instead of, balance, functional and strength training.

Some movements may need to be modified or avoided, especially if high risk.

When available, seek advice from exercise professionals who have training on osteoporosis.

Environmental scan of exercise services for fall and fracture prevention in Ontario

- We are looking to identify how exercise services are delivered in the community, the types of exercises that are provided, and the needs of exercise professionals.

- We are looking to conduct Interviews that will take 45-60 mins, where we will ask about the services you deliver, and how we can help support you.

- You are eligible to participate if you deliver any exercise service that incorporates some form of fall and fracture prevention, either virtually, or in person.

For inquiries, kindly contact us at:

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This study has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Board.

THANK YOU!

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NAR AT THE UNIVERSITY OF WATERLOO NETWORK FOR AGING RESEARCH

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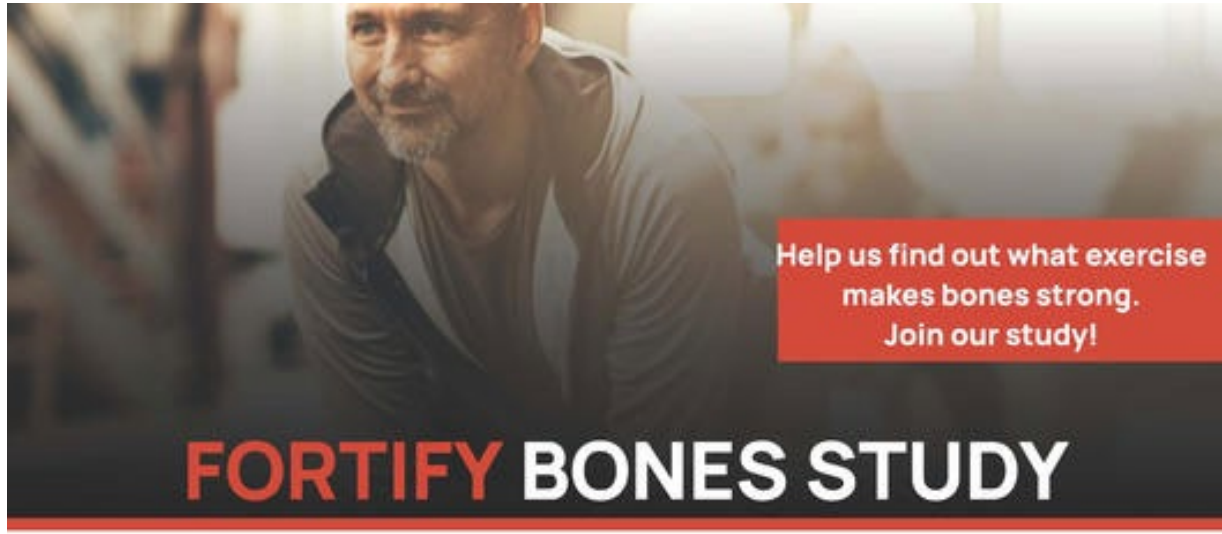

Participants in this study

- Men or postmenopausal women aged 50 or over
- Are willing to participate in twice weekly exercise for 12 months in Waterloo, Saskatoon, or Markham
- Have low bone density, osteopenia, or osteoporosis and are not taking osteoporosis medication

Study Involves:

- Two times weekly exercise
- Assessments of muscle strength, balance
- Dietary assessments
- Bone mineral density scans

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For further information, contact:
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