1.) Question: Hello, I live out in Vancouver BC and am interested in becoming a bone fit trainer. Would the trainer workshop be offered out here? Thanks!

(Sarah please answer)

2.) Question: do you have additional spinal sparing illustrations suitable for patient ed?

We have created a few videos that might be helpful (http://www.osteoporosis.ca/after-the-fracture/videos/). They are part of the "After the Fracture" series, which may also be useful for patient education.

3.) Question: is jogging too vigorous after vertebral fracture?

Our recommendations suggest that individuals with osteoporosis who have sustained an osteoporotic vertebral fracture should emphasize moderate intensity aerobic physical activity over vigorous physical activity, and jogging would be considered vigorous in the context of an adult with osteoporosis. However, the recommendations also state that the decision to participate in an activity or not should be made with a health care provider, and should consider history of activity, patient preferences, time on therapy and time since fracture. So, for example, a person with only one vertebral fracture who has since been on osteoporosis medication for several years, has a history of jogging for years and has a strong desire to continue doing so may be able to continue if their health care provider considers the benefits of jogging to outweigh the risks in that patient. That said, there is a risk that higher impact activities like jogging can cause another fractures, so it would be advisable to find other, lower impact activities that are enjoyable.

4.) Question: You mentioned avoiding twisting and rotating....is there any evidence/ studies behind these recommendations? Would you recommend gentle ROM stretches in all directions?

There are no studies that randomize people with osteoporosis to groups where one does twisting and the other does not, and measures whether there is an increase in fractures with twisting. Our consensus process, which was based on observational studies, clinical trials (e.g., adverse event reporting in clinical trials of exercise in individuals with spine fracture) and clinical expertise, resulted in recommendations around movements that should be modified in individuals with osteoporosis. Those movements include **repetitive, rapid, weighted or end-range** flexion or twisting of the spine. Gentle, controlled twists, performed in supine (lying on one's back), not to end-range (so to a mid-point in the range of motion) are considered acceptable for most people. Supine is recommended because by lying down, your spine is not loaded down with your body weight – you are "unloading" the spine. The loads on your spine are greater in standing and even greater in seated, so it is more risky to perform twists in standing and seated than in supine. If there is a need to perform flexion/extension range of motion for the spine, then it is recommended that some of the body's weight is supported, e.g.,

on all fours, and that gentle, controlled flexion/extension is only performed to mid-range (not to the end of the range of motion.

5.) Question: Can you comment on the load on the lumbar and thoracic spine bending forward from the waist compared with bending forward from the hips in standing

Forward flexion of 30 degrees increases the load on the lower thoracic and lumbar spine – the load starts to increase at about T10 and increases at leach lower spinal level. Shear force profiles would be substantially increased with forward flexion of the spine, and further increased if a load was held in the hands in front of the body. Bending using a hip hinge (http://www.osteoporosis.ca/after-the-fracture/videos/) with a neutral spine would reduce the loads on the lumbar and thoracic spine when compared to bending forward by flexing the spine. Body position affects spinal loading, with or without weight; spinal loading during standing increases with increasing kyphosis, but can be reduced with an anterior pelvic tilt or increased lumbar lordosis to compensate. Further, the presence of one vertebral fracture results in changes of the angulation of the spinal segments, even in the absence of noticeable changes in thoracic kyphosis.

6.) Question: What are your feelings about using TRX, which uses your own body weight?

TRX can be used as a method of resistance training in individuals with osteoporosis provided the spine sparing strategies are employed – modify or avoid activities that involve rapid, repetitive, end-range and weighted forward flexion or twisting of the spine. Also, steps to prevent falls are recommended, such as non-slippery floors, shoes with good traction, and ensuring the TRX system is secure.

7.) Question: In general do you recommend a recent (2-3 yr) T and L spine xray to document the number of vertebral fractures prior to exercise recommendations ?

Spine X-rays should be performed in accordance with clinical practice guidelines for the management of osteoporosis. A patient should be referred for X-rays and a fracture risk assessment should be done in the presence of 6 cm of historic height loss, or 2 cm measured height loss, if a fracture risk assessment has not been performed by a family physician or specialist. If a physician does not suspect a fracture or does not feel a new X-ray is warranted, then exercise prescription should be done using the available information. Spine sparing strategies can be applied for all individuals with osteoporosis when recommending exercise, with or without an X-ray diagnosis of vertebral fracture. If a spine fracture is strongly suspected but there is no X-ray evidence, clinical judgement on exercise recommendations is warranted.

8.) Question: Have new studies shown that water exercises are helpful for osteoporosis/

Not to my knowledge.

9.) Question: we all know that weight - bearing exercises encourage bone strength. Extension is also promoted. In the same line of thinking, wouldn't ROM in all directions be beneficial to maintain bone strength? In the webinar, it was answered by saying do supine twists and very gentle ROM with spine unloaded but wouldn't a progression to that be to do seated/ standing rotations - as it is a very functional movement which is very hard to avoid no matter how hard we try to remember. OR is it being suggested that just try as hard as possible to avoid those twisting motions in your day to day activities? Wouldn't regularly doing ROM in all directions keep your muscles strong and loose which would allow for incident free ADL?

ROM exercises do not strengthen muscles, and it is not clear how they would maintain bone strength. ROM exercises by definition are designed to increase ROM. It is arguable that a stable trunk and trunk muscles with good endurance and motor control are preferable to a very flexible trunk in individuals with osteoporosis. ROM exercises to mid-range are acceptable, and the position they can be performed in safely will depend on the person's fracture risk, and on their motor control. Spinal flexion, extension or rotation ROM to end-range is not recommended for individuals with osteoporosis. Training trunk flexors or rotators to improve core endurance is recommended and can be achieved using isometric exercises, or holds (e.g., abdominal bracing, front and side planks on wall or floor), which are preferable to exercises that involve active trunk flexion or twisting (e.g., curl ups, sit-ups). Exercises to improve endurance of trunk flexors or extensors can be progressed from supine through to standing, to ensure incorporation of correct core activation through functional movements. Combining endurance of trunk muscles with spine sparing strategies (e.g., step to turn, hip hinge) is recommended for preventing incidents during physical activities of daily life or leisure.

10.) Question: do you suggest any formal way to measure the success of the exercise regime in working with the elderly from beginning a program?

Great question! Our research did not address how to evaluate progress, but we do recommend assessing medical history, fracture and fall risk, physical performance, posture and barriers and facilitators to activity to inform prescription. You might consider having the person set goals and define what success means, and then choosing an outcome that reflects it. You could also base them on the therapeutic goals – if the intent is to improve balance, you could use benchmarks or assessments for balance e.g., ability to progress from feet together to semi-tandem stance to tandem stance to one legged standing, or more formal tests of balance. Muscle strength and power during functional movements could be measured using a simple assessment of lower extremity muscle strength during sit-to-stand, or a 5 times sit to stand test. You could also evaluate body mechanics during movement, gait speed, or changes in posture (e.g., occiput to wall test, flexicurve).