

Standing post Spinal Cord Injury – A guide for Health Professionals

Many people with spinal cord injury would like to return to standing post injury, either through the use of aids or equipment. Standing has been said to improve blood pressure, pain and spasticity and maintain range of movement following spinal cord injury. Additionally, it can result in significant psychological and social benefits for people with spinal cord injury.

Research has focused on what benefits can be achieved through returning to standing post spinal cord injury. There are also risks associated with standing, including fractures, orthostatic hypotension, autonomic dysreflexia, increased pain and spasticity. Unfortunately, there is no clear consensus from the research that has been conducted regarding any potential benefits of standing post spinal cord injury. What has been shown is that the ability to return to standing post spinal cord injury is dependent on multiple factors and the risks associated with standing can outweigh any possible benefit that may be achieved.

Factors influencing standing post SCI

Standing post spinal cord injury is dependent on the completeness of the spinal cord injury, time since injury, age, and other medical factors and risks.

Many persons with spinal cord injury no longer have enough muscle power to support their weight independently. Advances in technology have led to the development of various types of aids and equipment which may assist with being able to stand post spinal cord injury.

To trial standing post spinal cord injury, it is important to consider medical factors and risks such as:

- 1) Osteoporosis and risk of lower limb fracture
- 2) Lower limb range of motion to allow for manipulation of lower limbs to sufficiently position for standing
- 3) The effects of standing on blood pressure (particularly, the risk of orthostatic hypotension associated with standing).
- 4) Integrity of skin
- 5) Obesity
- 6) Other medical comorbidities are stable/well-controlled
- 7) Significant lower limb oedema
- 8) Unstable spine

1. Osteoporosis

Within the first six months after spinal cord injury, the bone mineral density rapidly decreases resulting in the development of osteoporosis. The loss of bone mass density impacts on the strength of bones and increases the risk of fractures. Research has shown that persons with spinal cord injury will lose approximately 50% of their pre-injury bone mineral density by the first to second year of injury and therefore have an increased risk of developing a lower limb fracture compared with individuals without spinal cord injury.

These fractures can develop from attempts to stand but can also occur with low impact activities such as bed mobility or transfers, due to rotational forces on the lower limbs.

It has been thought that weight bearing exercise could improve bone mineral density. However, clinical studies involving standing/weight-bearing activities after spinal cord injury are limited or demonstrate inconsistent or non-beneficial results hence this lack of available evidence and research does not support this reason to stand.

The current investigations used to measure bone mineral density do not focus on the areas of highest fracture risk in persons with spinal cord injury. Currently, bone mineral density scans are the usual investigation for osteoporosis, but these scans assess bone mineral density in the back and at the hip. Persons with spinal cord injury are most likely to fracture the bones just above or below their knee (the distal femur or proximal tibia). Furthermore, excess bone development (heterotrophic ossification), arthropathy (bone degeneration), previous surgeries, and neuropathic changes may falsely elevate the bone mineral density readings in a bone mineral density scan leading to incorrect conclusions.

Prophylactic treatment for osteoporosis has also only demonstrated limited evidence in males with paraplegia and this evidence only demonstrated a maintenance of bone mineral density rather than improvement in bone mineral density.

2. Lower limb range of motion

To stand safely, appropriate hip and knee range of motion and muscle lengths are required. Muscle shortening around the hip joint, knee joint and ankle/foot (known as contractures) impairs the ability to weight bear through a straightened hip and knee and heel, meaning an individual is unable to position their limb appropriately and safely within a standing frame or wheelchair.

The longer the time since injury, the more likely the person is to have developed leg contractures due to seated positioning from chronic wheelchair mobility and a lack of stretching. If contractures have developed, a person may be at risk of fractures from torsional forces if attempting to use standing equipment. Bones become weaker than soft tissue and are more likely to fracture.

3. Orthostatic hypotension

Persons with spinal cord injury frequently suffer from pronounced orthostatic hypotension following postural changes (such as moving from a lying position to a sitting position) or following prolonged periods of sitting. Orthostatic hypotension can persist for years post spinal cord injury and has been found to worsen with age. Over half of persons with spinal cord injury who engage in tilt-tabling (passive standing) experience orthostatic hypotension which may lead to dizziness, light-headedness or unconsciousness.

4. Skin integrity

Skin injury is always a risk during transfer, particularly when transferring between aids or pieces of equipment. Utilising standing equipment may also cause injuries to the skin from pressure from the equipment. Any pressure injuries would then need to be managed appropriately with the complete removal of pressure which may include complete bed rest. Please see the Queensland Spinal Cord Injury Service factsheets regarding skin care management for further information.

5. Obesity

Persons with spinal cord injury are at risk of putting on excess weight. The dimensions and weight limits of available equipment influence safe use of the equipment. Increased body habitus increases the pressure/forces placed through the lower limbs when attempting standing which may result in the development of a fracture.

6. Other medical comorbidities are stable/well-controlled

- a. In some people with spinal cord injury, increased tone and spasm may be so severe that standing is unsafe and not recommended unless in a closely controlled environment such as a physiotherapy gym.
- b. In people with cardiovascular disease, the effort of standing may induce abnormalities that place the person at risk. This person needs medical advice and clearance prior to commencement of any standing.

- c. In people with spinal cord injury who had sustained previous fractures, the person will need medical advice to pursue standing.
- d. Standing and the effort involved may place added strain on an already compromised respiratory system. Medical advice is required for clearance.
- e. Dependent oedema can often worsen with standing and will need careful assessment and appropriate management (Do you want to add a link to the oedema management fact sheet?)
- f. Satisfactory spinal fracture healing and stability are important prior to standing to minimise the risk of implant failure and fracture displacement

If choosing to stand

Given the available information and lack of clear evidence, if choosing to pursue standing the following is therefore recommended:

- 1) Assessment of history of fracture, the results of a bone mineral density scan (within the limitations of the scan) and discussion regarding the use of osteoporotic medication. Contact should be made with a service with expertise in SCI management.
- 2) Assessment of lower limb range of motion and spasticity by a rehabilitation physician or physiotherapist with experience in spinal cord injury.
- 3) Closely monitored initial sessions with aids or equipment to ensure no negative consequences are occurring (including monitoring of blood pressure and skin).
- 4) Understanding the risks of developing a lower limb fracture or skin injury (as well as possible aggravation of other medical conditions) which may result in necessary medical interventions including potential surgical management of fracture, immobility, autonomic dysreflexia and so on.
- 5) General medical advice regarding suitability and optimisation of other medical comorbidities.

References and Resources

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