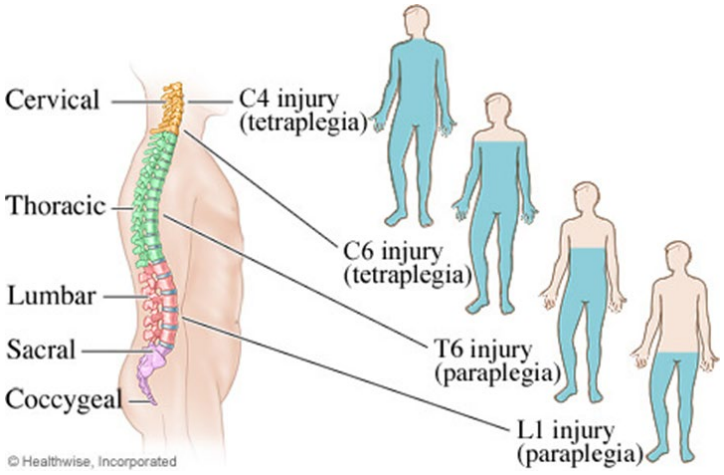
Physiotherapy for Athletes with Spinal Cord Injury

Introduction:

Spinal Cord Injury (SCI) is damage to the spinal cord that results in a loss of function such as mobility or feeling. The injury usually occurs as a result of a trauma such as a fall or car accident, or as a result of other back and spine conditions.

- Quadriplegia (also known as tetraplegia) is loss of function below the neck.
- Paraplegia is loss of function below the chest (arms have full function).



Degrees of Spinal Cord Injury:

The medical degree of function after injury can be measured according to the five-level ASIA Impairment Scale. They are:

ASIA A = Complete: No motor or sensory function below the level of the SCI.
ASIA B = Sensory Incomplete: Sensory function below neurologic level is normal (i.e. they can feel some touch, heat/cold and pain) but no motor function (movement) below neurological level.
ASIA C = Motor Incomplete: Motor function is preserved below neurologic level and more than half of the key muscle groups below neurological level have a muscle grade less than 3.
ASIA D = Motor Incomplete: Motor function is preserved below neurologic level and at least half of the key muscle groups below neurologic level have a muscle grade of 3 or more.
ASIA E = Normal: Sensory and motor function is normal.

This document was prepared in collaboration with Paralympics Australia and the Queensland Academy of Sport.

Physiotherapy Considerations:

- Understand the innervation corresponding to the level and completeness of the SCI, and what muscle groups and movements the athlete has. If the athlete does not have trunk control, consider what effect this lack of innervation has on posture in the chair, and how the shoulders or other structures are loaded. Athletes without trunk control sit in greater degrees of posterior pelvic tilt and this does not promote optimal scapulothoracic or glenohumeral function. There is also a higher prevalence of shoulder pain in athletes without trunk control.
- Consider what other areas and structures are getting loaded as a result of how the athlete moves, or the asymmetries that exist, especially the shoulders, both in sports specific skills, but also ADL's ie transfers, wheelchair propulsion. Be aware of what the athlete's function and range of movement is and adapt activities to maximise function.
- Consider the athlete's wheelchair set up (day chair and sports chair) and work with Sports Seating and Engineering to develop customised equipment interfaces. Will often need to accommodate to the posture rather than correct to an "anatomical norm". Aim for symmetry as much as possible for ideal joint and body loading, recognising that this isn't always possible. Consider ergonomic adjustments for wheelchairs including lightweight, adjustable frames where possible to assist with decreasing load on the shoulders during propulsion.
- Consider wheelchair propulsion mechanics, working on strength and range of motion to optimise technique.
- For athletes that are wheelchair users encourage regular maintenance and review of their chair to ensure optimal function and promote injury prevention.
- Ensure the athlete spends appropriate time out of the wheelchair as well so that they can change position and lengthen out through legs, hips and spine where possible. Lying prone can be particularly helpful with lengthening out through the hips and providing a sustained stretch.

This document was prepared in collaboration with
Paralympics Australia and the Queensland Academy of Sport.

- As a result of the activity and load the upper limbs are subjected to these athletes often present with forearm tightness. Sustained stretching through the forearm muscle groups can be useful.
- Understand how the athlete performs different transfers, level of assistance required, and whether they use any other adaptive equipment ie slide sheets or boards etc, what their bathroom set up is in terms of equipment ie commode and shower chair. Work on strength and range of motion to ensure optimal transfer technique to minimise risk of injury. Consider and plan around this for travel in terms of accessible accommodation and adaptive equipment.

Medical risk factors:

Autonomic Dysreflexia (AD): Sudden high blood pressure that can cause brain haemorrhage or seizures. Can start as a pounding headache and profuse sweating. Immediate medical attention is required ***as this is a life threatening situation***. Individuals with spinal cord injuries from T6 and above are at particular risk. Know whether the athlete has ever had Autonomic Dysreflexia before, ask about what triggered this and what the normal treatment routine is. Sometimes AD can occur in response to urinary tract infection so it is important for the athlete to look for warning signs of this (e.g. cloudiness or discoloration of urine). Seek early medical support.

Signs and Symptoms may include:

- Pounding headache, which gets worse as the blood pressure rises
- Blurred vision
- Flushing and blotching of the skin above the level of the spinal cord injury
- Profuse sweating
- Goose bumps/Chills without fever
- Bradycardia
- Hypertension

Pressure Injuries:

- Lack of sensation and tissue bulk loss leave the athlete at high risk of developing pressure injuries in the areas that the athlete cannot feel.
- Some of the common sites for skin and pressure injuries include the buttock and sacrum (from prolonged sitting) and other areas over bony prominences.
- Ensure regular checks of the seated equipment (sporting and day use) occur to ensure appropriate seating and pressure management is in place. It is important that the athlete has clear pathways on how to have seating reviewed and modified/replaced as required (eg via NDIS or state health service, regular OT or Physio).
- Consider custom seating/cushion for airline travel.
- When the athlete reports a skin injury, make sure they seek early care from a doctor or nurse.
- Need to monitor training load and adjust load/repetition as required.
- If an athlete is using a new wheelchair, cushion or other adaptive device, close monitoring of the fit and how the athlete interfaces with this is required.
- Ensure there is appropriate time out of the wheelchair as well so that the athlete can change position and lengthen out through legs, hips and spine where possible.
- Ensure appropriate hygiene strategies are in place to minimise issues.

Thermoregulation: Some athletes (not all) might have issues with thermoregulation. This might mean that sweating is not possible and that athletes can't lose body heat using convection. They can overheat quickly and become very unwell. This is a serious health issue and it is important to be aware of this risk (ask the athlete about their ability to sweat). Pre-cooling, frequent rests, timing of training and exercise in the shade are all helpful strategies.

This document was prepared in collaboration with
Paralympics Australia and the Queensland Academy of Sport.

Urinary Tract Infections: Individuals with SCI's have an increased risk of developing UTI's. Identify those athletes with past history or recurrent UTI's and ensure appropriate medical management is in place.

Signs and Symptoms Include:

- Strong, persistent urge to urinate
- Passing frequent, small amounts of urine
- Cloudiness or discoloration of urine
- Pain, fever, nausea or vomiting

Prevention: It is important to ensure that athletes are well hydrated, and strict hand washing and catheter hygiene practises are in place.

In summary, it is useful for physios to know:

- What level is the SCI and what muscles function (i.e. is there any function in hands, upper abdominals, lower abdominals, back extensors, hips/legs)? How does this influence performance?
- Is the SCI complete or incomplete?
- Is there any history of autonomic dysreflexia?
- Is there history of frequent UTI, skin injury?
- Can the athlete thermoregulate (sweat)?
- What adaptive equipment is used by the athlete?
- How does the athlete transfer (e.g. in/out of car)?
- Are there any long term issues with pain or injury (e.g. shoulder pain)?

This document was prepared in collaboration with
Paralympics Australia and the Queensland Academy of Sport.

Resources, Links and References

Spinal Cord Injuries Australia https://scia.org.au

PA UTI protocol

Faulkner, K. (2010). Shoulder pain in wheelchair athletes. Sports Physiotherapy, 3, 13-15.

Fullerton, H. D., Borckardt, J. J., & Alfano, A. P. (2003). Shoulder pain: a comparison of wheelchair athletes and nonathletic wheelchair users. Medicine and Science in Sports and Exercise, 35(12), 1958-1961.

This document was prepared in collaboration with
Paralympics Australia and the Queensland Academy of Sport.