Queensland Spinal Cord Injuries Service

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Fact Sheet

Cauda Equina or Lower Motor Neuron Injuries

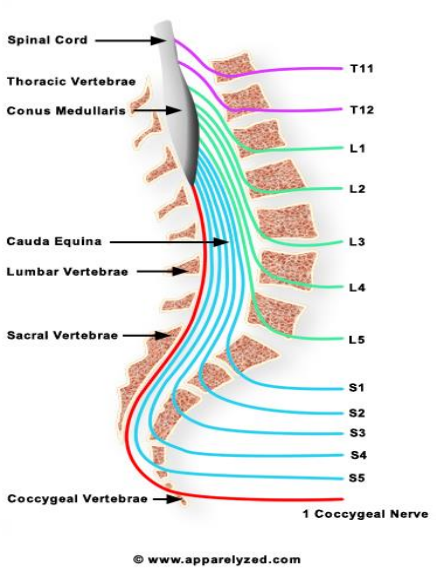
This fact sheet provides general information on some of the changes someone may experience as a result of having a Lower Motor Neuron Injury. Please note there is additional information provided via hyperlinks throughout this document. These links will redirect to the Queensland Spinal Cord Injuries Service (QSCIS) website.

Basic Definition of a Lower Motor Neuron (LMN) Injury

A lower motor neuron (LMN) injury can result from a cauda equina injury or conus injury. In the lumbar region of the spine, there is a spray of spinal nerve roots called the cauda equina. Cauda equina in Latin means the horse's tail.

A conus injury is a similar injury but is higher up in the cord around L1 or L2 level at the level of the conus of the cord. This injury may be seen as a mixed presentation of an upper motor neuron (UMN) and LMN injury. (See picture opposite)

The LMN lesion presents with flaccid or no tone and minimal or nil reflexes (floppy). Other nerve roots in the lumbar region can also be damaged.



What happens as a result of the injury?

A LMN injury is accompanied by a range of symptoms, the severity of which depend on how badly the nerve roots are damaged and which ones are damaged. All injuries are different, and it is difficult to compare from one person to another.

Motor Changes: Walking and Mobility

The nerves supply the muscles and each level controls different muscles. As damage occurs to the nerve roots in the lumbar region, there may be a different presentation of function depending upon the damaged area. See below for a detailed description of the lumbar nerve levels and their effect on function.

Level	Movement (action of the muscles)	What the action looks like
L1/L2	Hip flexors	Bends the hip up to help with swing through when walking
L2/L3	Knee extensors (quadriceps) Hip adductors	Straightens the knee Pulls the legs together
L4	Ankle dorsiflexors Knee flexors (hamstrings)	Pulls the foot up to assist with clearing the foot during the swing phase Bends knee using inner thigh muscles
L5	Long toe extensors Stronger knee flexion	Pulls the toe up Bends the knee using outside thigh muscles
S1/S2	Ankle plantar flexors Hip extensors (gluteals) Hip abductors	Pushes the foot down (like pushing on accelerator pedal) Straightens the hip Controls the hip and pelvis from dropping during stance
S4/S5	Voluntary Anal Contraction	Bowel & Bladder control Control of sexual functions such as erection

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Motor Changes: Walking and Mobility (Continued)

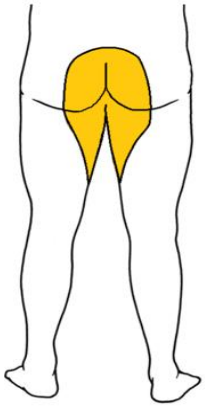
Being able to walk is dependent on the remaining functioning muscles from a Cauda Equina or Conus injury. The amount of recovery will affect the person's walking pattern and independence with walking. It may also affect their ability to perform higher level skills such as running and jumping.

A person with Cauda Equina injury might have the ability to flex their hip, straighten their knee and possibly pull their foot up but then could be unable to extend their hip or push their foot down. While this person may be able to walk, their walking pattern will be abnormal, use more energy and rely on having the hips pushed forward to keep them upright. Without the hips pushed forward this person may collapse. They will also show instability at the hips and present with a 'waddle' type picture where the pelvis drops on side of the weight bearing leg.

People with these injuries may walk but may also need to use a walking aid for balance and stability, especially on uneven surfaces.

Depending on the extent of the nerve damage there will be muscle wasting in certain muscle groups which may impact on their skin integrity.

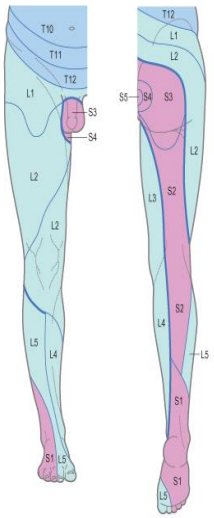
Sometimes people may need to be assessed to see whether their level of injury will have an impact on their ability to drive due to decreased strength, co-ordination, proprioception (knowing where the feet are placed) and reaction times.
Returning to Driving Brochure



Sensory Changes

There may also be changes to feeling below the level of injury. One of the common changes after a cauda equina injury is saddle anaesthesia. **Saddle anaesthesia** is where the person is unable to feel anything in the body areas that would sit on a saddle (see the picture). Skin care is very important as the person may have impaired feeling to light touch, pain, temperature and pressure in varying degrees. For this reason it is important to be careful when sitting on hard, rough or hot surfaces. Moving regularly and checking the skin for any damage with a mirror and by feeling will help identify any problems. Different sensory levels are show in the table below and picture opposite.
Skin Care Brochures

Level	Area of Sensation (Feeling)
L1	Hip girdle and groin (general hip area)
L2/L3	Anterior thigh (front of the thigh)
L4	Medial aspect of the leg (inside of the leg)
L5	Lateral aspect of the leg (outside of the leg)
S1	Heel and middle of the back of the leg
S2	Posterior thigh (back of the thigh)
S3	Medial side of the buttocks (inside half of the buttock)
S4 and S5	Perineal region (around the genitals)



Queensland Government

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Pain
People can experience pain associated with the injury. Further information on the classification of the pain can be found in this brochure:
Brochure on Pain Management following Spinal Cord Injury for Health Professionals

Bladder Management
Feelings of fullness and control of voiding (emptying the bladder) may be affected and this may mean problems with incomplete emptying or not knowing when to empty the bladder. There may be an issue with stress incontinence (leaking) due to poor sphincter tone (bladder neck muscle strength). The person may need to learn how to empty their bladder by doing intermittent self-catheterisation or need an indwelling catheter to help drain the bladder. This will prevent problems with overstretching the bladder, bladder infections and renal (kidney) damage. The best method of bladder management should be determined by the treating doctor and the person may need to be referred to an Urologist for further tests.

Intermittent Self-Catheterisation Brochure for Males
Intermittent Self-Catheterisation Brochure for Females
Brochure on Caring for and Changing a Supra-pubic Catheter

Bowel Management
Feelings of knowing when to empty the bowels and control over the bowel motions may be affected. There may also be a problem having active abdominal muscles and no anal tone or a flaccid sphincter (floppy muscle) can result in faecal incontinence (accidents). The person may need to manage a new bowel routine to prevent bowel accidents.
A Guide to the Management of Lower Motor Neuron Bowels

Sexual function
Sexual function is linked with the nerves that control the bowel and bladder. Sensation can be affected by cauda equina injury. Males can experience problems with erection, ejaculation and fertility, and women can experience changes in lubrication and orgasm.

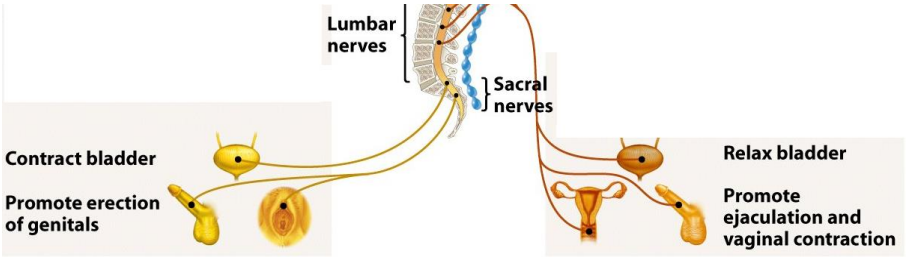

Figure 45-20 Biological Science, 2/e
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Adjustment to having a Lower Motor Neuron Injury
Having a LMN injury has been described by some as being an “invisible injury” where the changes cannot be seen by other people such as the bladder, bowel and sexual function. It can also be difficult to explain to others in the community what the injury means to them. The impact of this disability can affect a person’s mood and ability to cope. Talking with someone can be helpful such as counselling. Your Spinal Rehabilitation consultant or the Spinal Outreach Team can provide more information.

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Referral to the Queensland Spinal Cord Injuries Service
The Spinal Injuries Unit Outpatient Department is part of Metro South Health's Central Referral Hub. This provides a single point of entry for all referrals to Princess Alexandra Hospital, including the Spinal Injuries Unit. Once the referral is received, patients are placed on a waiting list for appointments which are then booked no more than 6 weeks ahead. The GP can fax a referral to 1300 364 248 and can phone 1300 364 155 with any questions. Further information can be found at www.health.qld.gov.au/metrosouth/specialty/central-referral-hub.asp

Resource:
American Spinal Injury Association Learning Centre
http://www.asia-spinalinjury.org/elearning/elearning.php

Dawodu S, Bechtel K, Beeson M, Hodges S, Humphreys S & Kellam J, updated December 18 2014 2014 Cauda Equina and Conus Medullaris Syndromes Clinical Presentation
http://emedicine.medscape.com/article/1148690-overview

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