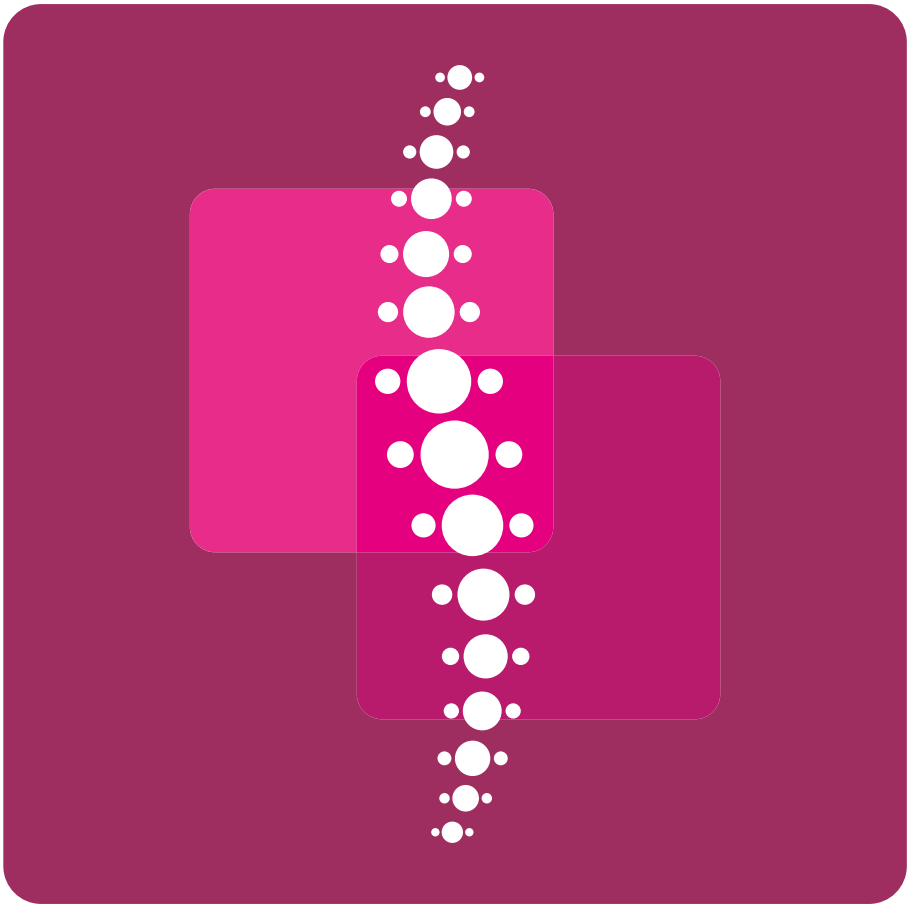
National Rehabilitation University Hospital

An tOspidéal Náisiúnta Athshlánúcháin

Essential Facts

About Spinal Cord Injury

Booklet 1



Spinal Cord Injury: What you need to know

This is one of a series of booklets developed by the Spinal Cord System of Care (SCSC) Team at the NRH.

Knowing as much as possible about your spinal cord injury will help you to learn, or re-learn, everyday living skills so you can achieve the safest possible level of independence.

Some of the medical terms in this book may be unfamiliar so please talk to your healthcare team about anything you don't understand or have questions about.

Common terms are explained at the end of each booklet.

Contents

Spinal Cord Injury Rehabilitation

Rehabilitation for spinal cord injury (SCI) aims to restore some, or all, of the physical abilities that you have lost due to injury, illness or disease. Rehabilitation also helps you to compensate for damage that cannot be repaired and to learn to manage the effects of your SCI. It does not reverse or undo damage, but it will help you restore and regain strength and ability to function well in your day to day life.

Your rehabilitation team (also called your treating team) at the National Rehabilitation Hospital (NRH) will design a rehabilitation programme for you, to assist you to achieve the highest possible level of ability, independence and quality of life.

No two people will react in the same way, or have the same needs, after a spinal cord injury. Therefore, it is important to speak to the healthcare professionals on your treating team about the personal goals you want to achieve and about your specific concerns and preferences. It can take a long time to learn to manage the changes that happen as a result of a spinal cord injury or illness.

At the start of your rehabilitation, the main focus may be on the physical changes that have taken place in your body. It can sometimes take longer to deal with the emotional changes that alter your sense of yourself, your confidence and your body image.

As with any loss, a mixture of feelings is very common and you may feel sad, angry, confused, scared, and lonely or out of control. In time you may also discover strengths that you did not know you had and grow in confidence as you develop new skills, interests and abilities.

Relationships with family and friends can also change and sometimes this can be surprising, or even hurtful. You may feel overwhelmed and try to act like nothing has happened or become withdrawn as you try to make sense of whatever happened that brought you to a spinal cord injury rehabilitation unit.

During your admission, and with time and support from family, friends and your rehabilitation team, you will begin to come to terms with your injury and make new goals for the future.

The Spinal Cord System of Care (SCSC) Programme at the NRH

The spinal cord injury programme at the NRH is called the Spinal Cord System of Care (SCSC). Your SCSC rehabilitation programme will include learning new skills, new facts and new ways of seeing things. Information talks for all SCSC patients will take place on a weekly basis.

One-to-one educational sessions, based on your individual needs, will take place on the Units and during your therapy sessions. If you, or your family or friends, would like additional information on anything to do with your care, please ask any member of your treating team.

Education is an essential part of rehabilitation. During your time at the NRH, your rehabilitation team will work with you and your family to make sure that you learn all you need to know about your spinal cord injury or illness.

Knowing as much as possible about your SCI will help you to learn, or re-learn, everyday living skills so you can achieve the safest possible level of independence.

Learning about spinal cord injury or illness can help you make sense of your own reactions, feelings, hopes and fears. This booklet is the first in a series of booklets that provides basic information on a range of topics that are important to know about when you have a spinal cord injury or illness.

These booklets will include answers to common questions that patients ask and provide a list of useful websites and other sources of information on spinal cord injury.

Basic Facts about Spinal Cord Injury

A spinal cord injury (SCI) is caused by damage to your spinal cord. Damage can be caused by a trauma such as a fall, or by a medical condition such as a tumour.

Before learning more about injury to the spinal cord, the next section will describe how the spine and spinal cord work when they are not damaged.

The Spinal Column

The spinal column is also referred to as the backbone. It is made up of bones called vertebrae and the spinal cord itself.

The 33 vertebrae are stacked on top of each other to make up four sections of the backbone. As shown below, each section of the backbone is given a name and each vertebra is given a number:

The Cervical Area:
7 cervical vertebrae in the neck named C1 to C7

The Thoracic Area:
12 thoracic vertebrae in the upper back named T1 to T12

The Lumbar Area:
5 lumbar vertebrae in the back named L1 to L5

The Sacro-coccygeal area:
5 fused sacral vertebrae and 4 fused vertebrae that form the coccyx

The Spinal Column

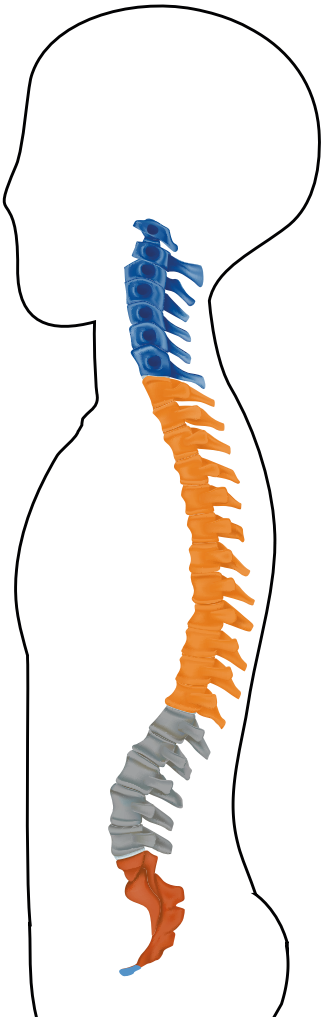
Cervical (7)
Area responsible for your breathing and arm movements

Thoracic (12)
Area responsible for strength and movement in your trunk and for your cough

Lumbar (5)
Area that moves your legs

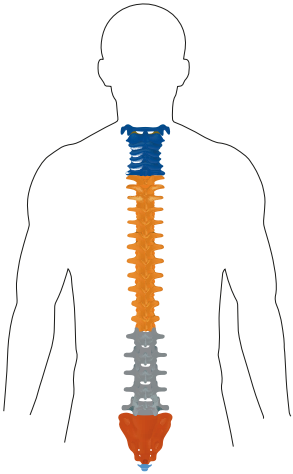
Sacrum (5-fused)
Area responsible for your bladder, bowel and sexual organs

Coccyx (4-fused)



At the bottom of the spinal cord is the cauda equina. This is a collection of nerves that look a bit like a 'horse's tail' which is where the name comes from.

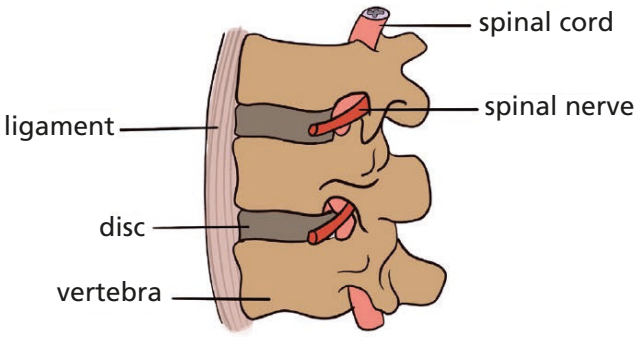
The spinal column begins in the neck and ends at the tailbone. It is strong and flexible and it plays an important role in surrounding and protecting the spinal cord.



Ligaments help to provide structure and stability as they hold individual vertebrae and groups of vertebrae together.

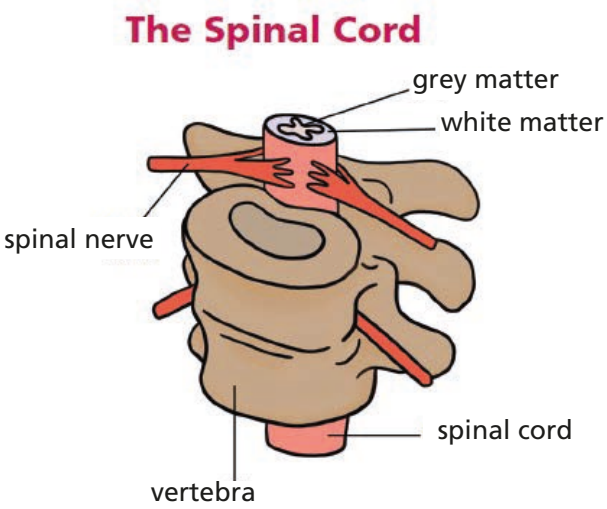
Between each vertebra are softer pads called discs. These pads prevent the bones from rubbing together and work as shock absorbers for the spinal column.

Muscles, along the spinal column, help to provide balance, stability and mobility.



The Spinal Cord

The spinal column begins in the neck and ends at the tailbone. It is strong and flexible and plays an important role in surrounding and protecting the spinal cord.



The spinal cord is a long structure of nerves, like a tube, which begins at the bottom of the brain (brainstem) and ends at the base of the first lumbar vertebra (L1). It is here that the spinal cord branches into the cauda equina. The spinal cord is approximately the width of your little finger and is similar to a computer cable. It is a two-way communication network that sends messages to and from your brain and specific parts of your body.

As shown in the diagram above, spinal nerves come out from the spinal cord through gaps between vertebrae. Spinal nerves start in the spinal cord and carry motor (movement), sensory (feelings) and reflexes to and from your brain to your body.

The Nervous System

The spinal cord is part of the nervous system. The nervous system is divided into two parts; the Central Nervous System **(CNS)** and the Peripheral Nervous System **(PNS)**. The brain and the spinal cord together form the Central Nervous System.

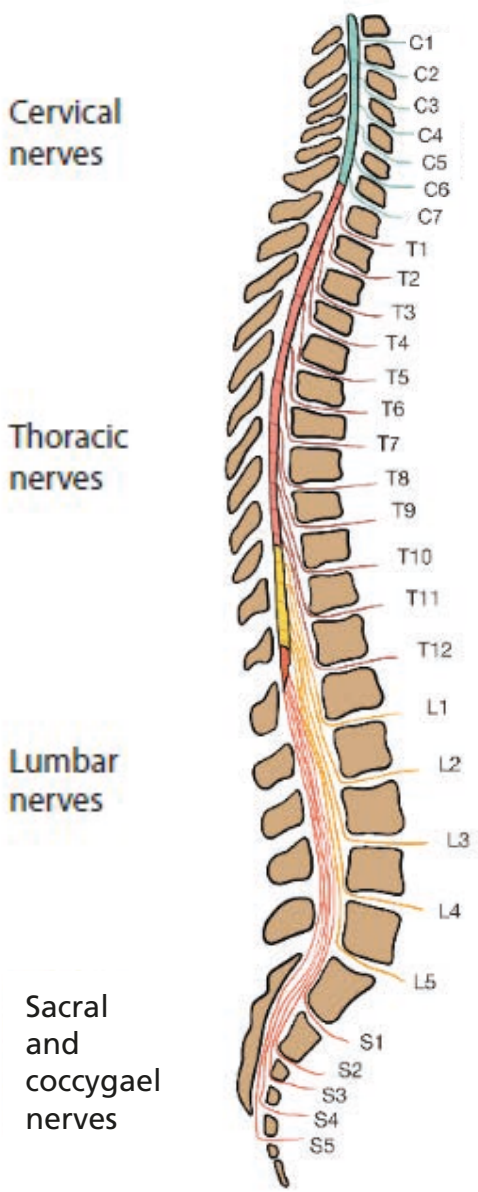
The spinal nerves are part of the **peripheral nervous system (PNS)**. The peripheral nervous system refers to the nerves outside the brain and spinal cord. The nervous system, including the brain as the control centre, helps control all body functions.

Messages to and from the brain travel through the spinal cord and the spinal (peripheral) nerves. Pairs of spinal nerves stretch out to each side of the body from the spinal cord through the gaps between vertebrae (see diagram on page 9).

Cerebrospinal fluid is a clear liquid that flows around the brain and spinal cord and acts like a cushion to protect them from injury.

The names and numbers of the spinal nerves match up with the names and numbers of the vertebrae. Each nerve has a specific job to do in relation to movement.

The Nervous System



C1 spinal nerve exists above C1 vertebra (and so forth)

The Central Nervous System (CNS) has 2 parts: **The Somatic Nervous System** and **The Autonomic System.**

The Somatic Nervous System

The somatic nervous system is responsible for starting and controlling the movements in your body.

Some of the functions controlled by the somatic nervous system are: **Movement**, **Reflexes** and **Sensation**.

Movement

These signals tell the muscles in your arms, hands, fingers, legs, toes, chest and other parts of the body how and when to move. Motor messages begin in the brain, travel through the spinal cord and out through the spinal nerves to the rest of the body.

Reflexes

A reflex is a muscle movement caused by a signal that does not come from the brain. Reflex signals happen very quickly and do not have to reach the brain before the body reacts. Some body signals only need to reach the spinal cord. Some bowel and bladder emptying, as well as spasms, are caused by reflex actions.

Sensation

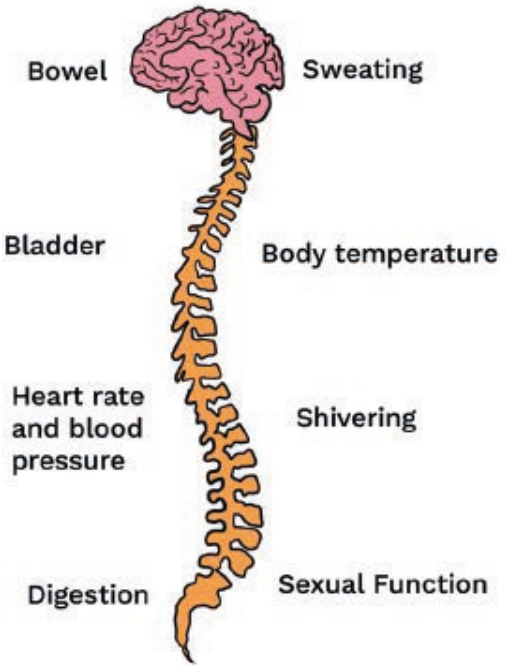
Feelings of hot, cold, pain and pressure are called sensory messages. If you are sitting for a long time, pressure builds up in the area you are sitting on. Messages are then sent along nerve pathways from that area of increased pressure, to the spinal cord, and then to the brain. A message then passes back out from the brain through the spinal cord telling you to move a little to relieve the pressure.

The Autonomic Nervous System

The **Autonomic Nervous System** regulates your internal glands and organs. As the name suggests, this system automatically controls a variety of bodily functions including:

- Bowel
- Bladder
- Heart rate and blood pressure
- Digestion
- Body Temperature, Sweating, Shivering
- Sexual Function

The **Autonomic Nervous System** is controlled by different parts of your spinal cord and brain.



Spinal Cord Injury

Spinal cord injury **(SCI)** occurs when there is damage to the spinal cord. Damage to the spinal cord can be called 'traumatic' or 'non-traumatic'.

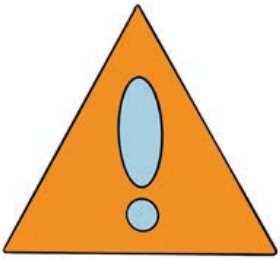
Traumatic injury is caused by a physical injury, for example, an accident such as a fall, a car accident or a collision on your bike.

Non-traumatic injury happens as a result of damage to your spinal cord for other reasons such as loss of blood supply, a tumour or degeneration of a spinal bone.

When a spinal cord injury occurs, communication between the brain and the body is blocked. After spinal cord injury or illness, messages below the level of the injury are unable to get past the damage in the spinal cord.

When you have a spinal cord injury some, or all, of the following changes may happen:

- Loss of movement (paralysis)
- Loss of sensation
- Changes in bladder control
- Changes in bowel control
- Changes in sexual function
- Changes in breathing
- Spasms
- Changes in blood pressure
- Changes in heart rate
- Changes in body temperature



Spinal Cord Injury CONTINUED

Depending on how you got your spinal cord injury and the type of injury, these changes may be temporary or permanent.

Complications such as pressure injuries and pain can develop as a result of spinal cord injury and are known as **secondary complications**.

Knowing as much as you can about your spinal cord injury and its consequences is the best way to prevent secondary complications developing.

Your treating team at the NRH will develop a rehabilitation programme designed to meet your specific needs and help you understand your Spinal Cord Injury.

Your programme is designed to allow you to live as independently as possible, achieve personal goals and become well informed and skilled in managing your condition.

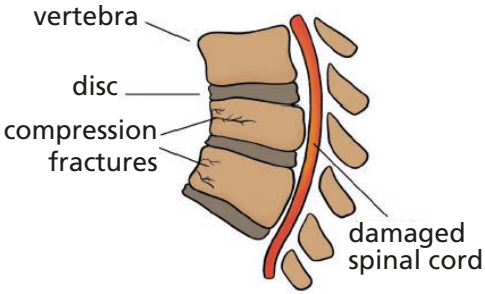
Please talk to your healthcare team about anything you don't understand or have questions about.

Spinal Fractures

There are many different types of spinal fractures. Two common examples are **Compression Fractures** and **Burst Fractures**.

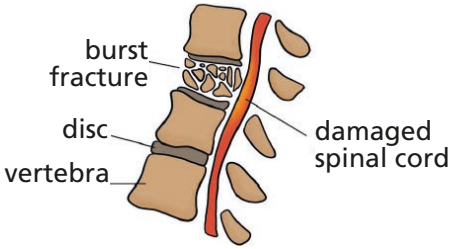
Compression Fractures

Compression fractures occur when the vertebra collapses as a result of pressure from an external force or from degeneration of the spinal bones.



Burst Fractures

A burst fracture typically occurs as a result of a trauma to the spine like a car accident or a fall from a height. The disc or vertebra in the spine is extremely compressed, (or squashed) and small fragments of bone spread throughout the spine causing damage to the spinal cord.



Describing Your Spinal Cord Injury

When speaking about your spinal cord injury, healthcare professionals will name the actual area of the spine which is damaged, for example, C4 meaning the damage happened to the 4th vertebra in the cervical part of the spinal column. Sometimes, they will refer to two or more vertebra, such as, T7 / T8.

This is because the damage to the spinal column is often described as the damage which occurs between 2 vertebrae, for example, T7 / T8 fracture dislocation: where the T8 bone might have been broken and as a result, moved out of its normal position in relation to T7. Spinal cord injury is described in two important parts: **Level of Injury** and **Severity of Injury**.

Level of Injury

The neurological (or nerve) level describes where the changes start to occur in your body as a result of your spinal cord injury. For example, if your level of injury is T4, then your body, arms and trunk are normal as far as T4 (around your nipples). Below that level your body has changed. If you have broken a bone during your injury, the level of injury may not be the same as the level at which the bone is broken.

T4 Complete

T4 Incomplete

Severity of Injury

The second part of the description of your spinal cord injury is the ASIA **(American Spinal Injuries Association)** impairment scale. This scale (described by the letters A-E), tells how severe the injury is.

An ASIA impairment scale 'A' injury is the most severe type of injury, while ASIA impairment scale 'E' is the least severe type. An ASIA impairment scale 'A' injury means there is no movement below the injury level.

If you have an ASIA impairment scale 'B' injury, then there are some sensations passing through the injury level as far as the area around your back passage (it is vital that the sensations are transmitted this far to confirm that your injury is ASIA scale 'B'). If you have a small amount of movement as well as some sensations around your back passage, then it is called an ASIA impairment scale 'C' injury.

If you have a moderate or large amount of movement and sensation, then it is an ASIA impairment scale 'D' injury.

Finally, if there is a full recovery of all movement and sensation, this is an ASIA impairment scale 'E' injury. We rarely see ASIA impairment scale 'E' injuries in rehabilitation.

See the parts of the body affected by levels of injury on page 22.

Levels of Injury (ASIA Impairment Scale)

Cervical
Tetraplegia

Areas affected:
Neck Muscles, Shoulders, Arms, Wrists, Hands, Chest Muscles, Bladder, Bowel

Thoracic
Paraplegia

Areas affected:
Chest, Abdomen, Legs, Bladder, Bowel

Lumbar
Paraplegia

Areas affected:
Buttocks, Legs, Bladder, Bowel

Sacral

Areas affected:
Buttocks, Groin, Toes, Bladder, Bowel

Note: An ASIA impairment scale A injury is also called a **'complete injury'** while the term **'incomplete injury'** means an ASIA impairment scale B, C, or D.

Why is it important to know my level of Injury?

It is important to know your level of injury so that you can manage it well. Knowing as much as you can about your SCI will also help you to understand the complications that may arise from it. This will then help you to look out for and prevent complications, and seek medical assistance where necessary.

It is also important that you know about your level of injury so that you can give this information to other healthcare professionals who look after you in the future.

Spinal cord injury is quite rare and it is therefore important that you can tell others about your care needs.

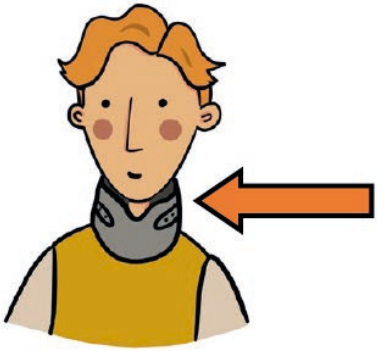
This type of information will help a healthcare professional to understand more about your spinal cord injury and what sort of treatment, help or support you may need.

Early Management of Spinal Cord Injury

In the Acute Hospital: In order to diagnose and identify the exact location of the fracture or dislocation in your spine, a **CT scan (Computed Tomography)** or **MRI scan (Magnetic Resonance Image)** will be performed.

The bones in your spinal column may not be stable, or a bone fragment may be pushing into the spinal cord. You may need surgery to stabilise the damaged bones of your spine. The type of surgery needed will depend on the type and level of injury. Often metal plates and screws are used to stabilise the spine and prevent further damage to the spinal cord.

If the injury is in the cervical area of the spine, a Halo ring and jacket might be used to keep the head and neck in one position while the injured area is healing.



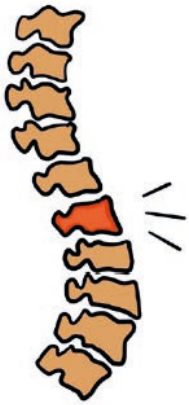
Spinal Shock

After spinal cord injury, the spinal cord can go into spinal shock. During this time, reflexes, movement and feeling may be lost below the level of your injury.

The reason for spinal shock is not completely known. In most cases, spinal shock starts to fade away after just a few days. For some SCI patients, spinal shock may take hours or weeks to resolve completely and for others it may take months.

The return of reflex activity below the level of your injury is a sign that you are coming out of spinal shock. The return of lost movement or feeling in the early weeks or months after injury is unique to each person. Recovery will depend on the type of trauma that happened to the spine.

Your medical team can describe all of this in greater detail to you, if you wish to know more.



Common Terms

The following terms may be used to describe and classify the type and extent of injury you have experienced. The phrases and terms you hear in relation to your spinal cord injury and to other injuries during your rehabilitation might seem strange and overwhelming to you. However, it is useful to become familiar with the terminology as it will help you understand the consequences of your injury and explain it to others.

ASIA impairment scale: ASIA (American Spinal Injuries Association) impairment scale is used worldwide to describe the loss of function that happens as a result of spinal cord injury. It measures movement and also how much sensation a person has at many points on the body.

Complete Spinal Cord Injury: means there is a total blockage of messages at the point of your injury. There will be no feeling or movement below the level of injury.

Incomplete Spinal Cord Injury: means that there is partial damage to the spinal cord. Some feeling or movement remains below the level of injury. The amount of feeling and movement lost will depend on how much damage has been done to the spinal cord.

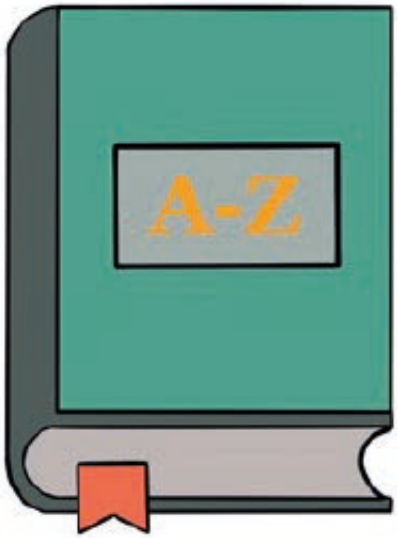
Paralysis: the inability to deliberately move some or all parts of your body. Paralysis can be described as:

- **Partial paralysis** when you still have some control over your muscles
- **Total paralysis** when you can't move your muscles at all

Paraplegia: occurs when the spinal cord is damaged in the lumbar or thoracic region. Injury at this level will cause loss of feeling and or movement in some or all of the chest, abdomen and legs.

Spinal Shock: Spinal shock is a temporary loss of all spinal reflex activity and autonomic disturbance below the level of injury. It resolves after a period of days, weeks or occasionally months. Reversal of spinal shock is not the same as recovery from spinal cord injury.

Tetraplegia (or Quadriplegia): occurs when the spinal cord is damaged in the cervical region. Injury at this level will cause loss of feeling and or movement in all four limbs, chest and trunk.



Frequently Asked Questions (FAQs) about Spinal Cord Injury

Do ASIA Scores change during or after rehabilitation?

Your **ASIA** impairment scale can change after injury. Change is most likely to happen between the time when the injury happens and one year afterwards. Change happens most rapidly within the first three to six months. In general, the change will mean a change in the description of the severity of injury.

For example, a person may have a C5 ASIA impairment scale 'B' Spinal Cord Injury at the time of injury and a C6 ASIA impairment scale 'C' SCI following rehabilitation. However, the likelihood of change is mostly determined by the level of your injury and the ASIA impairment scale when you are first examined in hospital.

Could I walk again in the future?

This is a common question in rehabilitation but unfortunately there is no one clear answer for everyone. Every spinal cord injury is unique and many factors can impact on a person's ability to walk.

Your treating team, who spend time assessing you, will be best placed to advise you about goals during and following rehabilitation.

Usually if you have an ASIA impairment scale 'A' SCI (a complete injury) when you first present to hospital, you are unlikely to walk. The possibility of walking again is better for those with an ASIA impairment scale 'B' or 'C' SCI. However, it depends on many factors, including the findings that your doctor identifies when he or she examines you, your age, other injuries and other medical conditions.

Even with an ASIA impairment scale 'B' or 'C' there may be significant challenges to walking. At the moment, there is no medical treatment available which automatically enables a person to walk, although extensive research is taking place across the world on all aspects of recovery after spinal cord injury.

Frequently Asked Questions (FAQs) about Spinal Cord Injury CONTINUED

How is the length of my rehabilitation programme decided?

Your rehabilitation programme is based on a series of goals. Usually rehabilitation lasts from 6 - 12 weeks. However, each person's injury and circumstances are different, and the length of rehabilitation may vary depending on many factors.

Your treating team are skilled at determining how long it should take you to achieve your goals and therefore, how long your rehabilitation programme needs to be.

Can my spinal injury get worse?

It is very rare for a spinal cord injury to get worse once you are over the acute period of your hospital care.

In a very small number of people, a cyst can develop on your spinal cord and can expand upwards which can make your injury worse. This can happen in the first year or two after SCI onset or indeed, several years later.

If this were to happen to you, you would usually develop new symptoms such as a new weakness in your upper limbs (if your injury is paraplegia). An MRI scan can identify the cyst. Sometimes, it needs to be drained surgically. However, this complication is very rare and you should not worry about it happening.

My Spinal Injury

My level of injury and ASIA Impairment Scale

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