

The SASCA Assistive Devices Guidelines for Persons with Mobility Impairment

March 2016



Assistive devices guidelines for persons with mobility impairment

SASCA supports the United Nations Convention on the Rights of Persons with Disabilities including:

- ❖ Article 9 (accessibility);
- ❖ Article 19 (independent living and community integration);
- ❖ Article 20 (personal mobility); as well as
- ❖ Article 26 (habilitation and rehabilitation)

SASCA furthermore supports the World Health Organization wheelchair guidelines which defines an appropriate wheelchair and accompanying wheelchair service steps to ensure comprehensive service delivery to wheelchair users. According to the WHO wheelchair guidelines, an appropriate wheelchair (p11) "...meets the user's needs and environmental conditions; provides proper fit and postural support; is safe and durable; is available in the country; and can be obtained and maintained and services sustained in the country at the most economical and affordable price."

Prescription of assistive devices is complex, and should take into account the impairment, activity limitation and participation restriction; as well as contextual factors and therefore the entire person within his/her individual context.

Guidelines on the assistive devices requirements for persons with mobility impairments have been compiled by members of SASCA, including therapists from the public and private sector experienced in rehabilitation.

The purpose of the guideline is to guide decision-makers and funders on the MINIMUM requirements for persons with mobility impairment, and in particular for persons with newly acquired spinal cord injury. For ease of reference, equipment needs have been outlined per impairment level. It is however important to acknowledge variation of functional ability and needs within each impairment level.

The guideline should therefore be interpreted with caution and as a guide only; and in consultation with experienced rehabilitation professionals.

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Level of injury/affliction	Nature of required wheelchair	Wheelchair accessories required	Bathroom appliances	Bedroom Appliances	Ramps and other mobility aids.	Assistive devices
C4	<p>Motorized wheelchair with the following features</p> <ul style="list-style-type: none"> - Electrical tilt in space - Manual adjustable recline - Wheelchairs must be able to accept appropriate third party posture support back system <p>Manual wheelchair with the following feature</p> <ul style="list-style-type: none"> - Mechanical adjustable tilt in space and recline - Height adjustable and removable armrests 	<p>Chin control or other specialized control (puff control)</p> <p>Specialized back support system (rigid / modular, lateral support and head rest)</p> <p>High risk pressure care cushion. Appropriate back-up cushion with good pressure care qualities with water proof cover. Appropriate arm support</p> <ul style="list-style-type: none"> - Gutters - Perspex lap-tray <p>Chest strap / harness</p> <p>Pelvic / thigh / calf / leg / foot strap</p>	<p>Taxi commode with adapted backrest for full back support</p>	<p>Manual or electric hospital bed.</p> <p>High quality pressure care mattress (air mattress or appropriate high risk foam mattress)</p>	<p>Hoist</p> <p>Telescopic ramps</p> <p>Transfer board</p>	<p>Resting or wrist extension splints for positioning</p> <p>Mouth stick</p>

Level of injury/affliction	Nature of required wheelchair	Wheelchair accessories required	Bathroom appliances	Bedroom Appliances	Ramps and other mobility aids.	Assistive devices
C5	<p>Motorized wheelchair with the following features</p> <ul style="list-style-type: none"> - Electrical tilt in space - Manual adjustable recline - Wheelchairs must be able to accept appropriate third party posture support back system <p>Light weight rigid or folding manual wheelchair</p> <ul style="list-style-type: none"> - mechanical tilt in space and recline features, - height-adjustable and removable armrests. - adjustable centre of gravity settings - rubberised pushrims 	<p>Chin control or hand control or other specialized control (puff control)</p> <p>Specialized back support system (rigid / modular, lateral support and head rest)</p> <p>High risk pressure care cushion.</p> <p>Appropriate back-up cushion with good pressure care qualities with water proof cover.</p> <p>Appropriate arm support</p> <ul style="list-style-type: none"> - Gutters - Perspex lap-tray <p>Chest strap / harness</p> <p>Pelvic / thigh / calf / leg / foot strap</p>	Taxi commode with adapted backrest for full back support	Manual or electric hospital bed. High quality pressure care mattress (air mattress or appropriate high risk foam mattress)	Hoist, Telescopic ramps Transfer board	<p>Resting or wrist extension splints for positioning</p> <p>Universal cuff</p> <p>Wheelchair gloves</p> <p>Typing stick</p> <p>Writing splint</p> <p>Boxing gloves</p>

Level of injury/affliction	Nature of required wheelchair	Wheelchair accessories required	Bathroom appliances	Bedroom Appliances	Ramps and other mobility aids.	Assistive devices
C6/7/8	<p>Motorized wheelchair with the following features</p> <ul style="list-style-type: none"> - Electrical tilt in space - Manual adjustable recline - Wheelchairs must be able to accept appropriate third party posture support back system <p>Light weight rigid or folding manual wheelchair</p> <ul style="list-style-type: none"> - mechanical tilt in space and recline features, - height-adjustable and removable armrests. - adjustable centre of gravity settings - rubberised pushrims 	<p>Hand control (joy stick)</p> <p>Back support system (rigid / modular, lateral support) High risk pressure care cushion.</p> <p>Appropriate back-up cushion with good pressure care qualities with water proof cover.</p> <p>Appropriate arm support</p> <ul style="list-style-type: none"> - Perspex lap-tray <p>Pelvic / thigh / calf / leg / foot strap</p> <p>Chest strap / harness</p>	Taxi commode with adapted backrest for full back support May be able to use self propelling commode with rubberised pushrims	High quality pressure care mattress: air mattress or appropriate high risk foam mattress	Telescopic ramps Transfer board	<p>Standing frame/calipers or leg braces</p> <p>Universal cuff</p> <p>Hand controls for adapted car and hoist,</p> <p>Typing stick,</p> <p>Wheelchair gloves</p> <p>Writing splint</p> <p>Boxing gloves</p>

Level of injury/affliction	Nature of required wheelchair	Wheelchair accessories required	Bathroom appliances	Bedroom Appliances	Ramps and other mobility aids.	Assistive devices
T1/2/3/4	<p>Motorised wheelchair for long distances and outdoor use</p> <ul style="list-style-type: none"> - Manual adjustable tilt - height-adjustable and removable armrests - Wheelchairs must be able to accept appropriate third party posture support back system <p>Light weight rigid or folding manual wheelchair</p> <ul style="list-style-type: none"> - mechanical tilt in space and recline features, - height-adjustable and removable armrests. - adjustable centre of gravity settings - Tension adjustable backrest or rigid back support system 	<p>Hand control</p> <p>Back support system (rigid / modular, lateral support) High risk pressure care cushion.</p> <p>Appropriate back-up cushion with good pressure care qualities with water proof cover.</p> <p>Pelvic / thigh / calf / leg / foot strap</p>	<p>Self propelling commode</p> <p>Grab rails for toileting</p> <p>Shower bench</p> <p>Bath bench</p>	<p>High quality pressure care mattress: air mattress or appropriate high risk foam mattress</p>	<p>Telescopic ramps</p> <p>Transfer board</p>	<p>Hand controls for adapted car and hoist.</p> <p>Standing frame / calipers or leg braces</p> <p>Wheelchair gloves</p>

Level of injury/affliction	Nature of required wheelchair	Wheelchair accessories required	Bathroom appliances	Bedroom Appliances	Ramps and other mobility aids.	Assistive devices
T5/6/7/8/9	<p>Motorized wheelchair for long distances and outdoor use</p> <ul style="list-style-type: none"> - Manual adjustable tilt - height-adjustable and removable armrests - Wheelchairs must be able to accept appropriate third party posture support back system <p>Light weight rigid or folding manual wheelchair</p> <ul style="list-style-type: none"> - mechanical tilt in space and recline features, - height-adjustable and removable armrests. - adjustable centre of gravity settings - Tension adjustable backrest or rigid back support system 	<p>Hand control</p> <p>Back support system (rigid / modular, lateral support) High risk pressure care cushion.</p> <p>Appropriate back-up cushion with good pressure care qualities with water proof cover.</p> <p>Pelvic / thigh / calf / leg / foot strap</p>	<p>Self propelling commode</p> <p>Grab rails</p> <p>Shower bench/bath seat</p>	<p>High quality pressure care mattress: air mattress or appropriate high risk foam mattress</p>	<p>Telescopic ramps</p> <p>Transfer board</p>	<p>Standing frame / calipers or leg braces</p> <p>Wheelchair gloves</p>

Level of injury/affliction	Nature of required wheelchair	Wheelchair accessories required	Bathroom appliances	Bedroom Appliances	Ramps and other mobility aids.	Assistive devices
T10/11 /12 & L1	Light weight rigid or folding manual wheelchair <ul style="list-style-type: none"> - mechanical adjustable tilt in space - adjustable centre of gravity settings - tension adjustable backrest or be able to accept appropriate third party posture support back system. 	Appropriate pressure care cushion with appropriate Back up cushion and waterproof cover Pelvic / thigh / calf / leg / foot strap	Self propelling commode Shower seat or bath bench Grab rails for toileting and bathing	Good quality pressure care overlay for the bed	Telescopic ramps Transfer board	Standing frame / calipers or leg braces Hand controls for adapted car and hoist Back slabs/ calipers for walking Rollator/walking frame/crutches AFOs Wheelchair gloves
L2-S5	Light weight rigid or folding manual wheelchair for long distance mobilization. <ul style="list-style-type: none"> - Mechanical tilt in space and recline features, - height-adjustable and removable armrests. - adjustable centre of gravity settings - Tension adjustable backrest or able to accept appropriate third party posture support back system. 	Appropriate pressure care cushion with appropriate Back up cushion and waterproof cover, Pelvic / thigh / calf / leg / foot strap	Shower seat or bath bench Grab rails for toileting and bathing	Good quality pressure care overlay for the bed	Telescopic ramps	Standing frame / calipers or leg braces Hand controls for adapted car and hoist Back slabs/ calipers for walking Rollator/walking frame/crutches AFOs Wheelchair gloves

Incomplete SCI all levels	<p>Incomplete SCI who are household and limited community ambulators who could propel a manual wheelchair will require the following wheelchair:</p> <p>Light weight rigid or folding manual wheelchair for long distance mobilization.</p> <ul style="list-style-type: none"> - Mechanical tilt in space and recline features, - height-adjustable and removable armrests. - adjustable centre of gravity settings <p>There are incomplete SCI who have little additional function and independence compared to those with complete lesions despite being incomplete and should access motorized wheelchairs and assistive devices based on their functional capacity as per the list above?</p>
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*All wheelchairs must have either ISO durability certification or meet SANS durability standards as adapted and specified by the South African National Wheelchair Tender. Wheelchair design, motor and battery capacity must meet user's environmental and functional needs. Wheelchairs must be able to accept appropriate third party posture support back system if required.

Note: Co-morbidities and/or contextual factors may result in a user requiring more posture support or additional assistive devices other than those list for his/her level.

Note: All wheelchair users who are to be transported in a vehicle sitting in their wheelchairs should be supplied with a head rest for safety

Appendix to the Assistive Devices Guidelines for Persons with Mobility Impairment

March 2016



Introduction:

Funding organisations spend hundreds of thousand of Rands on the rehabilitation of persons with spinal cord injuries but when these SCI patients are ready for discharge, there appears to be a lack of understanding of what the out of hospital needs are in order for the person with a SCI to basically just cope with life.

The Assistive Devices Guidelines for Persons with Mobility Impairment provide guidelines on what types of wheelchairs and other assistive devices are essential or the day to day functioning of rehabilitated spinal cord injured persons.

However the guidelines do not explain **why** these devices are needed. This appendix addresses the “why” by illustrating the consequences of spinal cord injuries at each level of injury, including case studies.

By illustrating why certain types of wheelchairs and other assistive devices are required, we trust that this appendix will provide funding organisations with an appreciation for the wheelchair and assistive device requirements per level of spinal cord injury, as described in the Assistive Devices Guidelines for Persons with Mobility Impairment .

George Louw



Foreword by the CEO of QASA:

QASA provides projects, products and services in order to develop the capacity and give opportunity for quadriplegics and paraplegics in South Africa. QASA is also a strong lobby and advocacy organisation ensuring human rights and dignity for our members

Publishing information is important to keep our members informed and offer them guidelines and information valuable to their development , health & wellbeing and independence. QASA, besides owning and publishing Rolling Inspiration magazine, a bimonthly glossy magazine aimed at the constituency of “people with mobility impairments”, also

publishes in the field of sexuality, sensitisation, access, medical reimbursement and employment. We are thrilled to be able to endorse and publish the SASCA Assistive Devices Guideline and this appendix thereto.

We also value the partnership with SASCA and long may this continue, as it has been extremely beneficial to the health professional sector and also QASA members.

This assistive device guideline document has all the necessary information in detail to understand the rightful assessment and issuing of assistive devices for people with spinal cord injury and will go a long way to ensure that quadriplegics and paraplegics are receiving their assistive devices and mobility aids.

We will continue to update this publication and distribute to members, funders and health professionals equally.

QASA is proud to endorse this guideline knowing that members of our organisation will be the ultimate beneficiary of the knowledge gained in this publication.

Thank you to everybody involved in the collation of the information and support of this document.

Ari Seirlis.

Quadriplegia / Tetraplegia

Quadriplegia / Tetraplegia is the medical term used when a person has a spinal cord injury above the first thoracic vertebra. Paralysis affects the cervical spinal nerves (C1-C8) resulting in paralysis in varying degrees in all four limbs. In addition to the arms and legs being paralysed, the abdominal and chest muscles will also be affected resulting in weakened breathing and the inability to properly cough and clear the chest.

Paraplegia

Paraplegia is a term used when the level of spinal cord injury occurs below the first thoracic spinal nerve (T1-S5). The degree at which the person is paralysed can vary from the impairment of leg movement, to complete paralysis of the legs and abdomen up to the nipple line. Paraplegics have full use of their arms and hands.

The ASIA Impairment Scale. Also known as the ASIA/ISCoS Exam and Grading System

A system used to describe spinal cord injury and help determine future rehabilitation and recovery needs. It is based on a patient's ability to feel sensation at multiple points on the body and also tests motor function. Ideally, it's first given within 72 hours after the initial injury.

Grade A: Complete lack of motor and sensory function below the level of injury (including the anal area)

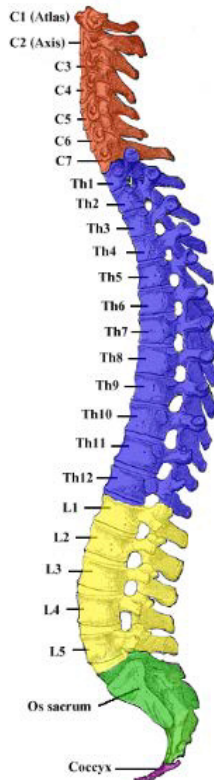
Grade B: Some sensation below the level of the injury (including anal sensation)

Grade C: Some muscle movement is spared below the level of injury, but 50 percent of the muscles below the level of injury cannot move against gravity.

Grade D: Most (more than 50 percent) of the muscles that are spared below the level of injury are strong enough to move against gravity.

Grade E: All neurologic function has returned.

Actions of the Spinal Nerves



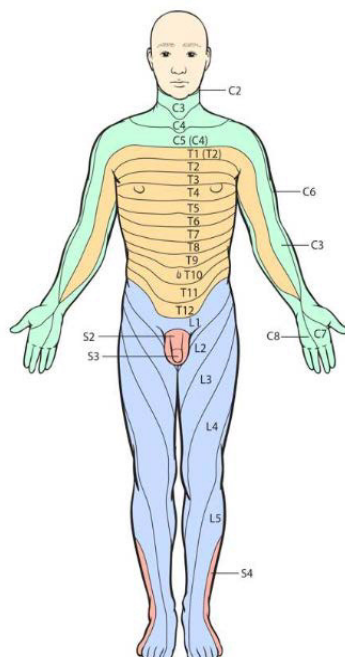
Level	Motor Function
C1–C6	Neck flexors
C1–T1	Neck extensors
C3, C4, C5	Supply diaphragm (mostly C4)
C5, C6	Move shoulder, raise arm (deltoid); flex elbow (biceps)
C6	Externally rotate (supinate) the arm
C6, C7	Extend elbow and wrist (triceps and wrist extensors); pronate wrist
C7, T1	Flex wrist; supply small muscles of the hand
T1–T6	Intercostals and trunk above the waist
T7–L1	Abdominal muscles
L1–L4	Flex thigh
L2, L3, L4	Adduct thigh; Extend leg at the knee (quadriceps femoris)
L4, L5, S1	Abduct thigh; Flex leg at the knee (hamstrings); Dorsiflex foot (tibialis anterior); Extend toes
L5, S1, S2	Extend leg at the hip (gluteus maximus); Plantar flex foot and flex toes

Cervical Spinal Cord Injuries

C1-4

Fallout

Impact



C1 – C4 injury

Most severe of the spinal cord injury levels.

Paralysis in arms, hands, trunk and legs.

Patient may not be able to breathe on his or her own, cough, or control bowel or bladder movements.

Ability to speak is sometimes impaired or reduced.

When all four limbs are affected, this is called tetraplegia or quadriplegia.

Requires complete assistance with activities of daily living, such as eating, dressing, bathing, and getting in or out of bed.

May be able to use powered wheelchairs with special controls to move around on their own.

Will not be able to drive a car on their own.

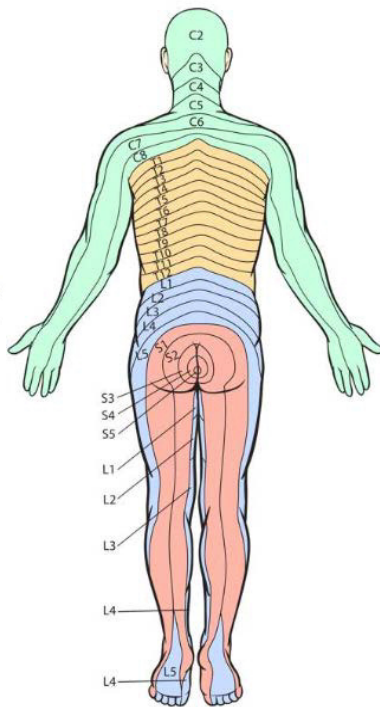
Requires 24-hour-a-day personal care.

Cervical Spinal Cord Injuries

C5

Fallout

Impact



C5 injury

Person can raise his or her arms and bend elbows.

Likely to have some or total paralysis of wrists, hands, trunk and legs.

Can speak and use diaphragm, but breathing will be weakened.

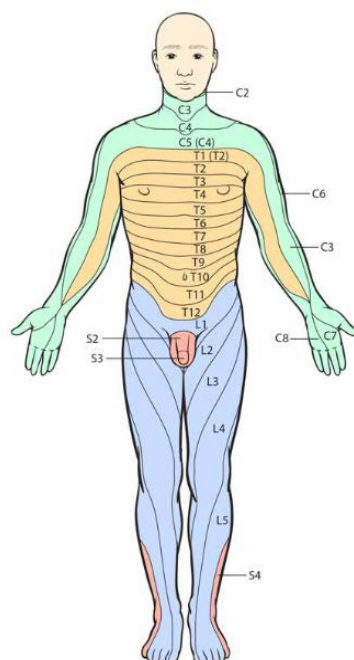
Will need assistance with most activities of daily living, but once in a power wheelchair, can move from one place to another independently.

Cervical Spinal Cord Injuries

C6

Fallout

Impact



C6 injury

Nerves affect wrist extension.

Paralysis in hands, trunk and legs, typically

Should be able to bend wrists back.

Can speak and use diaphragm, but breathing will be weakened.

Can move in and out of wheelchair and bed with assistive equipment.

May also be able to drive an adapted vehicle.

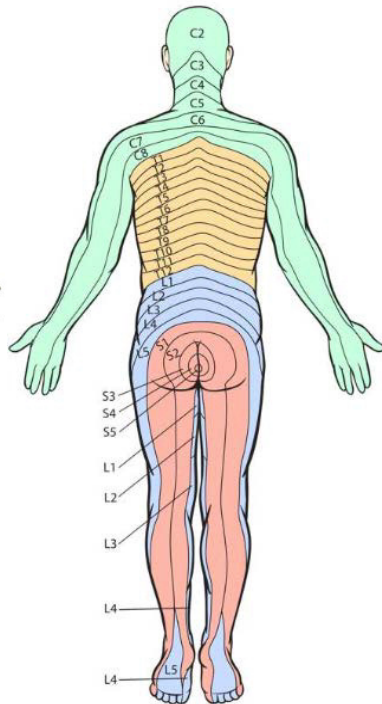
Little or no voluntary control of bowel or bladder, but may be able to manage on their own with special equipment.

Cervical Spinal Cord Injuries

C7

Fallout

Impact



C7 injury

Nerves control elbow extension and some finger extension.

Most can straighten their arm and have normal movement of their shoulders.

Can do most activities of daily living by themselves, but may need assistance with more difficult tasks.

May also be able to drive an adapted vehicle.

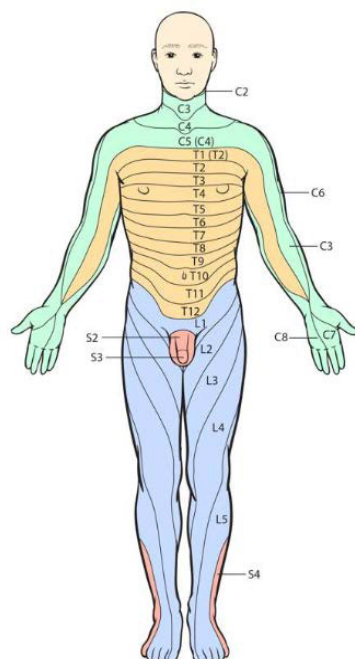
Little or no voluntary control of bowel or bladder, but may be able to manage on their own with special equipment.

Cervical Spinal Cord Injuries

C8

Fallout

Impact



C8 injury

Nerves control some hand movement.

Should be able to grasp and release objects.

Can do most activities of daily living by themselves, but may need assistance with more difficult tasks.

May also be able to drive an adapted vehicle.

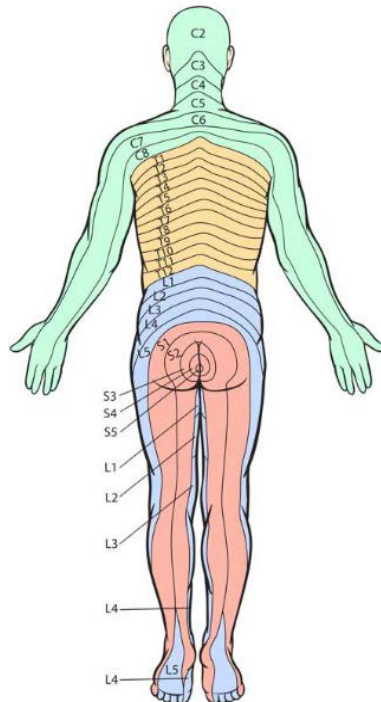
Little or no voluntary control of bowel or bladder, but may be able to manage on their own with special equipment.

Thoracic Spinal Cord Injuries

T1-T5



Fallout



Impact

Thoracic Nerves (T1 – T5)

Corresponding nerves affect muscles, upper chest, mid-back and abdominal muscles.

Arm and hand function is usually normal.

Injuries usually affect the trunk and legs (also known as paraplegia).

Most likely use a manual wheelchair

Can learn to drive a modified car

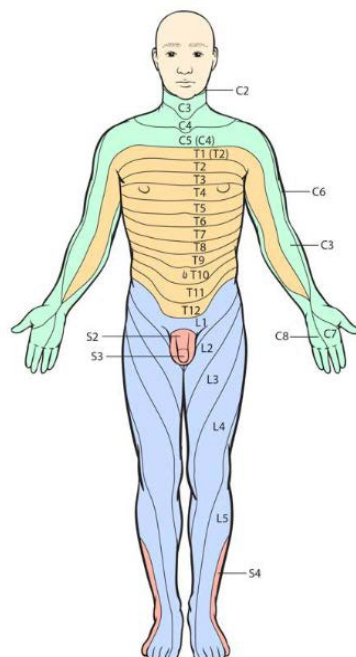
Can stand in a standing frame, while others may walk with braces

Thoracic Spinal Cord Injuries

T6-T12



Fallout



Impact

Thoracic Nerves (T6 – T12)

Nerves affect muscles of the trunk (abdominal and back muscles) depending on the level of injury.

Usually results in paraplegia

Normal upper-body movement

Fair to good ability to control and balance trunk while in the seated position

Should be able to cough productively (if abdominal muscles are intact)

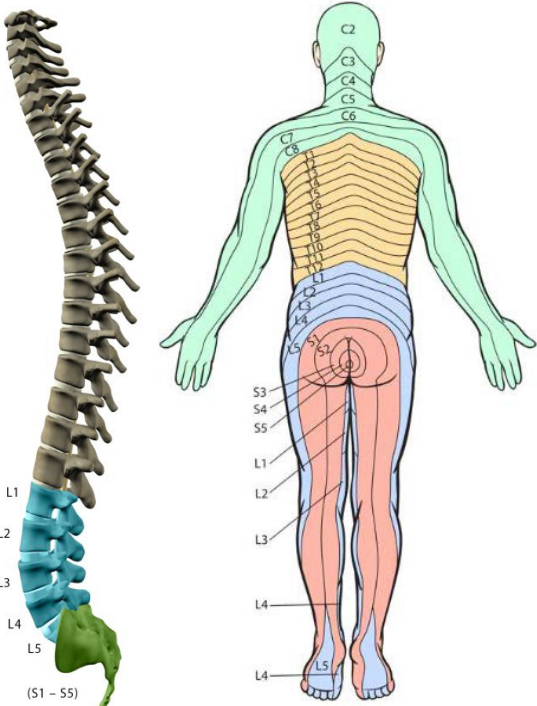
Little or no voluntary control of bowel or bladder but can manage on their own with special equipment

Most likely use a manual wheelchair

Can learn to drive a modified car

Can stand in a standing frame, while others may walk with braces.

Lumbar and Sacral Spinal Cord Injuries

L1-S5	Fallout	Impact
		<p>Lumbar Nerves (L1 – L5)</p> <p>Injuries generally result in some loss of function in the hips and legs.</p> <p>Little or no voluntary control of bowel or bladder, but can manage on their own with special equipment</p> <p>Depending on strength in the legs, may need a wheelchair and may also walk with braces</p>
		<p>Sacral Nerves (S1 – S5)</p> <p>Injuries generally result in some loss of function in the hips and legs.</p> <p>Little or no voluntary control of bowel or bladder, but can manage on their own with special equipment</p> <p>Most likely will be able to walk</p>

CASE STUDIES IN QUADRIPLÉGIA



Ari Seirlis



Anthony Ghillino

Ari and Anthony both have quadriplegia from cervical spine injuries; Ari from a diving accident 30 years ago and Anthony sustained his injury after the open bakkie in which he was sitting in the back, was involved in an accident and rolled.

It is quite evident from the two photographs that Anthony's wheelchair requirements are more intensive than Ari's.

Ari's level of lesion is C5 and the fallout is a **spastic paralysis from his nipples downward**. He therefore still has shoulder function and **partial/limited function of his arms and hands**. This allows Ari to function well on a manual wheelchair with power-assist – see the large hub of the wheel. It contains an electric motor that he can switch on to assist him on inclines or difficult terrain. In addition to the wheelchair Ari needs a **transfer board** that helps his carer to move him from his chair into the driver seat of his car. He also requires a **commode** to facilitate the use of a toilet. As CEO of QASA, Ari is very dependent on efficient use of his computer. **Voice activated software** and **devices that assist with typing and writing** enhances his efficiency and his quality of life.

Anthony's lesion is just one vertebra up from Ari's at C4 but this small anatomical difference has huge functional implications. His fallout is from the **shoulders down**. This leaves him with a **complete spastic paralysis and no functionality of his arms, trunk and legs**. Anthony's needs are therefore far more extensive than Ari's. He needs a **motorized wheelchair** with **electrical tilt in space** and **chin control**.

In his words: "Electrical tilt in space enables me to change my position without being lifted and helps prevent pressure sores. I also often feel dizzy, especially first thing in the morning and being able to tilt alleviates the dizziness quickly. The chin control enables me to move my motorized wheelchair myself giving me a level of independence."

Further wheelchair needs include a **head rest**, a specialised **pressure care cushion** with **waterproof cover**, a **chest strap**, **padded foot rests** and a padded **knee pommel**.

In Anthony's words: "The head rest is for comfort, especially when travelling in a vehicle. The pressure care cushion assists with pressure care/relief and helps to prevent pressure sores with the waterproof cover necessary for unexpected mishaps. The chest strap prevents me from sliding over when I spasm and secures me to the wheelchair when I am in a vehicle. The skin under my feet is extremely sensitive and shoes give me pressure sores on the ball of my feet so the padded foot rests help to prevent pressure sores from developing. The knee pommel prevents me from sliding forward and out of my chair when I spasm. It "locks" me into position."

Further to the above Anthony needs a number of other appliances, all with excellent reasons, including:

For the bathroom; a commode with high backrest used in roll in shower.

For his bedroom; an electric wall mounted hoist, a high quality pressure care mattress and a CPAP machine.

For traveling; a vehicle rear entry hoist/lift, a vehicle tie down system and portable ramps.

For his work; voice-activated software, an infrared head pointer remote mouse with puff switch and a stylus with extension.

A CASE STUDY OF THORACIC PARAPLEGIA



Kanayo Okwuraiwe

Kanayo has a **partial spastic paralysis from his bellybutton downwards** following a motor car accident fourteen years ago.

The level of his injury is T10 which means that his **stomach muscles are compromised**. This results in a loss of stability in his trunk and therefore it places additional strain on his shoulders, arms and wrists when he propels himself in his wheelchair.

Kanayo **currently uses a lightweight manual wheelchair**. However due to **his compromised stomach muscles he would like to have a power-assist function for his wheelchair**. In his words: "It will help with wheeling, especially long distances and up hills and rough terrains, which is very difficult, more so as a result of my recent diagnosis of Chronic Kidney Disease and my inability to exert a lot of energy without tiring out."

Kanayo is very prone to pressure sores. To assist with prevention he has a high risk pressure care cushion for his wheelchair as well as a high quality pressure care mattress for his bed.

The partial loss of his stomach muscles left Kanayo with a compromised ability to balance his trunk. He therefore has a taxi commode with an adapted backrest for full back support to assist him with his bathroom activities.

Kanayo's home has two steps to the front door which he is unable to scale without a ramp.

A CASE STUDY OF LUMBAR PARAPLEGIA



Mzamo Twani

Mzamo was injured in a motor car accident five years ago. The level of her spinal cord injury was at L1-L2, leaving her with a **complete spastic paralysis from the waist down**.

Mzamo requires a **manual wheelchair** with **height adjustable and removable armrests**.

In her own words: "Armrests helps a lot during pressure relief and make it easy for me to get in and out of it independently." (**Pressure relief**: Pressure sore prevention includes lifting the buttocks from the seat every once in a while to restore circulation.)

In addition she needs the following appliances:

Bathroom: A **taxi commode** with adapted backrest for full back support for assistance with toilet and showering.

General: A **transfer board** for quick and easy independent transfer from her wheelchair to e.g. a car seat.

From the case studies it is quite evident that fallout from injuries that appear similar can be vastly different. Millimeters differentiate between reasonable functionality and almost complete loss of functionality.

Lower level injuries that at first glance appear to be "less severe" often require functional aids that are not indicated for higher level injuries.

The need for assistive devices therefore cannot be simplistically split into "paraplegic needs" and "quadriplegic needs". Each person needs to be assessed individually

Sources used in compiling this appendix:

- 1 Shepherd Center; Understanding Spinal Cord Injuries.
- 2 Apparelysed; Spinal Cord Injury Peer Support
- 3 Wikipedia; Spinal Cord Injury



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QASA's mission is to be an effective co-ordinating, policy-making and supporting organisation striving to prevent spinal cord injury and to promote and protect the interests of people with mobility impairments through advocacy, lobbying and delivery of services and



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