

MIDLANDS CRITICAL CARE & TRAUMA NETWORKS

ADULT AND PAEDIATRIC TRAUMATIC SPINAL CORD INJURY BEST PRACTICE GUIDE

ADULT & PAEDIATRIC TRAUMATIC SPINAL CORD INJURY BEST PRACTICE GUIDE

Networks
Midlands Critical Care & Trauma Networks
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INTRODUCTION

The aim of this best practice guide is to provide hospital staff with information for the safe care and management of an adult person or child / young person with a suspected or confirmed traumatic spinal cord injury who is being cared for outside a non-specialist spinal cord injury centre (SCIC).

The enclosed guide is set out in sections defining specific core elements based on best practice and documentation that should be used by a hospital trust. These specific core elements include information about the referral and transfer process to a SCIC and the rehabilitation support and management of an adult person or child / young person with suspected or confirmed spinal cord injury.

We have also included a number of useful documents like the adult 24hour checklist shown in Appendix 1 and Paediatric version Appendix 1a and posters like that shown in Appendix 4 that you may wish to use and/or display.

The specific child / young person information is written in Blue.

IMPORTANT PLEASE READ!

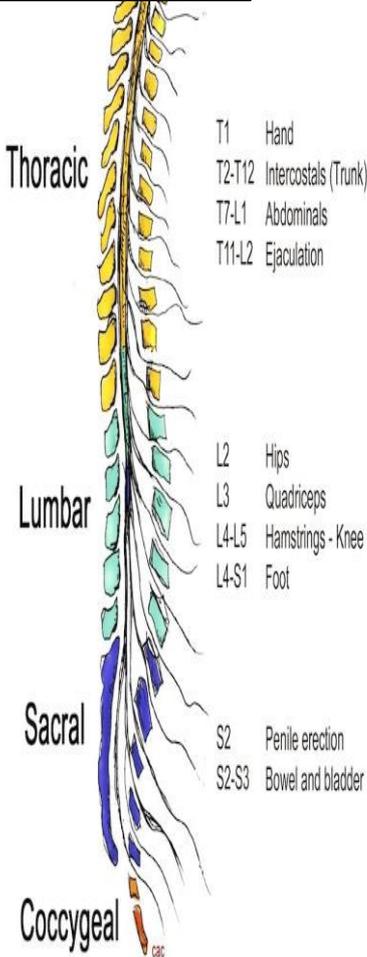
Spinal Cord Injury (SCI)... THINK... ACTION

Cervical Spine

THINK:

- Respiratory status?
- Weak Cough?
- Respiratory dependency?
- CVS Instability?

- Neck Muscles
- Diaphragm
- Deltoid (shoulder)
- Wrist
- Triceps
- Fingers



S	STABILITY	<ul style="list-style-type: none"> - Vertebral? <i>Spinal Clearance</i> <i>Log Roll</i> <i>Collar</i> - CVS? <i>Bradycardia</i> <i>Hypotension</i> -Respiratory? <i>Respiratory Rate</i> <i>Abdominal breathing</i> <i>Fatigue</i> <i>Weak cough</i>
P	PROTECTION	<ul style="list-style-type: none"> - Stability - Positioning - Skin - Collar? - Anticoagulation - TEDS
I	INSUFFICIENCY	<ul style="list-style-type: none"> - CVS? - Respiratory? - Cough? - Bladder/Bowel?
N	NUTRITION	<ul style="list-style-type: none"> - NBM (48 hours) - Bowel Sounds? - Dietician?
A	ASSESSMENT	<ul style="list-style-type: none"> - Neurology? <i>ASIA assessment</i> - Respiratory? <i>Breathing pattern</i> <i>Effort / SOB</i> <i>Cough?</i> <i>Fatigue</i> - CVS - Other injuries?
L	LOCATION	<ul style="list-style-type: none"> - ITU / HDU? - Observation bed - Speciality ward? - SCI unit referral? <i>National SCI Database</i>
C	CARDIOVASCULAR	<ul style="list-style-type: none"> -HR -BP (MAP) -Temperature <i>Autonomic Dysreflexia</i>
O	OBSERVATIONS	<ul style="list-style-type: none"> - Neurological - Cardiovascular - Respiratory
R	RESPIRATORY	<ul style="list-style-type: none"> - Rate - Effort - Pattern - Cough - Fatigue
D	DEPENDENCY	<ul style="list-style-type: none"> - Care - Pain - Communication - Positioning - Mobility - Function - Impairments - Disability

ELEMENT 1a: Referral Process to a Spinal Cord Injury Centre

Rationale:

Once a spinal cord injury has been identified clinically or on imaging, contact should be made with the regional SCIC within 4 hours of diagnosis. See Appendix 4 for criteria for admission. The pathway is:

Assessment by Relevant / Specialist Spinal Surgery Team in Major Trauma Centre (MTC) or Trauma Unit (TU), to diagnose spinal cord injury.

Completion of the ASIA assessment and initiate best practice spinal cord injury care

**Within 4 hours of diagnosing
a spinal cord injury**

Doctor to Doctor discussion with the spinal cord injury team at the SCIC around injury interpretation and initial management advice including potential surgical options. This should be documented in medical notes.

a) Oswestry: 01691 404000

b) Southport: Follow up phone call to discuss case if required: Ring Switchboard 01704 547471 - ask for Spinal Consultant on Call

Thoracic Spine

Lumbo-Sacral Spine

THINK:

-Bladder

-Bowels

- Chest Trauma

3 for UHCW and BCH – Northamptonshire and Kettering patients
referral should be to Stoke Mandeville via Switchboard: 01296 000000

Specific SCIC admission & acceptance criteria can be found in Appendix 5.

Enter all necessary information onto the
National Spinal Cord Injury Database
within 24 hours
via www.mdsas.nhs.uk

The SCIC will provide a treatment plan

Addition info:

Any queries Wrekin Ward (Oswestry) can be contacted for advice 01691 404406

[Any queries Alice Ward \(Oswestry\) can be contacted for advice 01691 404444](tel:01691404444)

A Consultant Nurse / Outreach Coordinator should perform an outreach visit within 5 working days if patient is not likely to be admitted within 7 days of database referral.

ELEMENT 1b: Adult Referral Checklist

1	Referring Doctor		Patient Details (or affix label)			
	Referring Consultant		Name:			
	Referring Hospital		Date of Birth:			
	Time of Call		Sex	M	F	Age
2	Mechanism of Injury e.g. RTA/Assault etc.					
	Relevant details of injury, including level of fracture:					
3	Time of Injury		Frankel Grade Score Definition A Complete loss of motor and sensory function B Incomplete - preserved sensation only C Incomplete - preserved motor (non-functional) D Incomplete - preserved motor (functional) E Complete return of all motor and sensory function, but may have abnormal reflexes			
4	Frankel Grade of Spinal Cord Injury					
5	GCS, pupils and time of arrival at A&E:		Time		Glasgow Coma Score	
			Pupils		Motor 6 Obeys Commands 5 Localises Pain 4 Flexes To Pain 3 Abnormal Flexion 2 Extension To Pain 1 No Movements Verbal 5 Orientated 4 Confused 3 Words Not Sentences 2 Noises Not Words 1 No Sounds Eyes 4 Open Spontaneously	
			Eye Opening			
			Motor Response			
			Verbal Response			
6	Neurological Assessment on arrival:		Time			
			Not able to perform /state why			

		Last normal segment		3 Open To Voice 2 Open To Pain 1 Closed
		Myotome		
		Dermatome		
8	Give details of any treatment given e.g. intubated/ ventilated, collar			
9	Current vital signs: P, BP, SaO₂:			
10	Other significant injuries and past medical or psychiatric history, including drug and alcohol use:			
11	Is patient on anticoagulants? Warfarin, Aspirin, Clopidogrel	Yes	No	Don't Know
12	Referral Clinician Tel No & Ext No:			
13	Name of clinician spoken to at Specialist Centre:			
14	Time of first contact with SpR:			
15	Details of information given to patient and family:			
16	Outcome of call - comments:	Patient Accepted		Patient Declined
	PLEASE TICK AS APPROPRIATE			
USEFUL TELEPHONE NUMBERS				
Oswestry Switchboard: 01691 404000 (Ask to page Spinal injury registrar on call)		Stoke Mandeville Switchboard: 01296 915000 (Northampton / Kettering patients only) (Ask to page Spinal injury registrar on call)		

ELEMENT 1b: Paediatric SCIC Referral Checklist

1	Referring Doctor		Patient Details (or affix label)				
	Referring Consultant		Name:				
	Referring Hospital		Date of Birth:				
	Time of Call		Sex	M	F	Age	
2	Mechanism of Injury e.g. RTA/Assault etc.						
	Relevant details of injury, including level of fracture :						
3	Time of Injury		Frankel Grade Score Definition A Complete loss of motor and sensory function B Incomplete - preserved sensation only C Incomplete - preserved motor (non-functional) D Incomplete - preserved motor (functional) E Complete return of all motor and sensory function, but may have abnormal reflexes				
4	Frankel Grade of Spinal Cord Injury						
5	GCS, pupils and time of arrival at A&E:		Time		Glasgow Coma Score		
			Pupils		Motor 6 Obeys Commands 5 Localises Pain 4 Flexes To Pain 3 Abnormal Flexion 2 Extension To Pain 1 No Movements Verbal 5 Orientated 4 Confused 3 Words Not Sentences 2 Noises Not Words 1 No Sounds Eyes 4 Open Spontaneously 3 Open To Voice 2 Open To Pain 1 Closed		
			Eye Opening				
			Motor Response				
			Verbal Response				
6	Neurological Assessment on arrival:		Time				
			Not able to perform /state why				
			Last normal segment				

		Myotome		
		Dermatome		
8	Give details of any treatment given e.g. intubated/ ventilated, collar			
9	Current vital signs: P, BP, SaO ₂ :			
10	Other significant injuries and past medical or psychiatric history, including drug and alcohol use:			
11	Is patient on anticoagulants?	Yes	No	Don't Know
12	Safeguarding concerns? Please give details	Yes	No	Don't know
13	Safeguarding referral completed?			
14	Referral Clinician Tel No & Ext No:			
15	Name of clinician spoken to at Specialist Centre:			
16	Time of first contact with SpR:			
17	Details of information given to patient and family:			
18	Outcome of call - comments:	Patient Accepted		Patient Declined
		PLEASE TICK AS APPROPRIATE		
USEFUL TELEPHONE NUMBERS				
Oswestry Switchboard: 01691 404000 (Ask to page Spinal injury registrar on call)		Stoke Mandeville Switchboard: 01296 915000 (Northampton / Kettering patients only) (Ask to page Spinal injury registrar on call)		

ELEMENT 1c: ASIA Chart and Completion Criteria

This is a system of tests used to define and describe the extent and severity of a patient's spinal cord injury and help determine future rehabilitation and recovery needs. It is ideally completed within 72 hours after the initial injury and pre and post any spinal surgery. Repeat ASIA assessments should also be completed at appropriate intervals to monitor any changes in neurology particularly when the SCI is thought to be incomplete.

For children / young people the ASIA assessment should be completed fortnightly as a minimum.

The patient's grade is based on how much sensation he or she can feel at multiple points on the body, as well as tests of motor function.

The ASIA chart and explanatory notes shown in Appendix 6 can also be found at <https://asia-spinalinjury.org>.

Element 2: Spinal Clearance

Rationale:

Failure to clear the spine, in particular the c-spine, can potentially risk secondary spinal cord injury. It is therefore of maximum importance that the cervical spine is cleared appropriately according to this protocol.

- a) All trauma patients with the potential for spinal injuries **must have a formally documented** spinal clearance before any exclusions from spinal precautions can be made
- b) Spinal clearance in ED must be authorised by one of the following personnel:
 - [Consultant Spinal Surgeon](#)
 - Consultant Intensivist
 - Consultant Orthopaedic or Neurosurgeon
 - Consultant Trauma Team Leader
 - Consultant Emergency Physician

If clearance cannot take place in ED then it should be carried out by relevant team:

- [Cervical spine – Consultant Neurosurgeon](#)
 - [Thoracic / Lumbar spine – Consultant Spinal / Orthopaedic Surgeons](#)
- c) **Clearly document spinal clearance in the patient's notes**
 - d) Accepted guidance used for cervical spinal clearance must be measured against clinical guidelines:
 - UHCW follow the NICE guidelines and use the Canadian C-spine Rule
 - UHNM follow the Canadian C-spine Rule
 - UHB follow the Canadian C-spine Rule
 - e) Ensure 24hour checklist is completed. See Adult - Appendix 1 and [Paediatric 1a](#)

Exceptions: None (under ANY circumstances)

Element 3: Moving and Handling

Rationale:

Patients should be moved and handled in such a way as to prevent secondary spinal cord lesions due to inappropriate mechanical forces and to prevent pressure area damage.

- a) All patients are removed from the scoop or spinal board within twenty minutes of arrival at the Emergency Department or as soon as possible
- b) All patients with a spinal cord injury are transferred from surface to surface by means of a spinal board and accompanying secure head device, scoop stretcher or vacuum mattress with pat slide
- c) Spinal column alignment to be maintained throughout all turns, procedures and transfer manoeuvres
- d) All patients must be assessed for pressure area protection on each roll
- e) All patients with a spinal cord injury (plus/minus spinal column) injuries are managed initially on a spinal bed or firm / foam mattress straight away. Dynamic / Airflow mattresses are **not** to be used without prior consultation with a spinal surgeon or the SCIC
- f) All patients will have a regime of 2-3 hourly spinal log roll turns, [for child / young people 2 hourly spinal log roll turns](#) should be established as soon as is practical from arrival and within 3 hours of admission to the unit. Patients can be left in the alignment side lying / running man position for a maximum of 3 hours and [2 hours in children](#), or as long as the patient tolerates it, whichever is shorter. Consider timely use of analgesia to promote the use of a side lying / running man position. Liaise with the physiotherapist/spinal practitioner and refer to the manual handling guidelines. If the regime is problematic, contact the SCIC for further advice. See Appendix 2
- g) All patients should be managed in a flat/ horizontal bed. Whole bed tilt, feet down to a maximum of 15° - 30° can be used if felt it would assist with medical management/ stability
- h) In supine block elevate feet to a 90° resting position, using pillows. **Care to ensure no direct contact with heels.** Do not force the feet into position. [Liaison with physiotherapy team regarding provision of PRAFO'S.](#) See pictures in Appendix 2
- i) Position the hands-on small pillows. It is good practice for nursing and therapy staff to consider that, for tetraplegic patients', shoulders should be abducted, and alternate arms raised at each turn, aiming for 90° abduction with lateral rotation. See Appendix 2

Element 4: Gastro-Intestinal Management

Rationale:

Patients are at increased risk of mucosal ulceration due to vagal over activity (in the high lesion patient). There is also an increased risk of abdominal distension resulting in splinting of the diaphragm. Acute spinal cord injured patients present with a transient paralytic ileus. Therefore, gut peristalsis must be nurtured, or patients have the potential to aspirate.

- a) All spinal cord injured patients are commenced onto gastrointestinal protection on admission through to discharge to a SCIC
- b) All spinal cord injured patients are kept nil by mouth for at least 48hrs. Light diet, enteral or parenteral feeding should be introduced gradually thereafter, providing bowel sounds are present
- c) Consider PN feeding if no bowel sounds. (Refer to Nutritional Support and Intestinal failure team)
- d) All spinal cord injured patients must be referred to a dietician for assessment and nutritional support within 72hrs

Exceptions: If a spinal cord injured patient has accompanying abdominal or head injury or surgery, introduction of feeding should be managed at the discretion and on the advice of the relevant consultant surgeon/ intensivist after the 48 hour nil by mouth period. Consider referral to Speech and Language Therapy for assessment of swallow.

Element 5: Bowel Management & Digital Rectal Examination

Rationale:

Acute spinal cord injured patients will present on admission with definitive neurological bowel dysfunction. Failure to appropriately care for the bowel function could seriously affect the patient's bowel rehabilitation and quality of life.

- a) A digital rectal examination must be performed on all spinal cord injured patients in the emergency department by the attending clinician with the following recorded in the patient documentation:
 - The anal sphincter status and presence of bulbocavernosus reflex

- b) Referral to the Urology team within 24hours of admission to the ward or PICU.

- c) All spinal cord injured patients should have a bowel regime instigated on admission which can be modified at a later stage according to the individual response

NB If suppositories being given please note presence of anocutaneous reflex at this point.

Exceptions: Abdominal trauma: modify the plan to the individual patient

Perianal trauma: modify the plan to the individual patient

Link: Guidelines for Bowel Management can be found on the MASCIP website www.mascip.co.uk

Element 6: Bladder Management

Rationale:

Acute spinal cord injured patients present with definitive neurological bladder dysfunction. The paralysed bladder is at significant risk of nosocomial infection. It is therefore of paramount importance to prevent bladder distension and catheter blockage.

- a) All spinal cord injured patients should be catheterised on admission
 For adults: with a size 12 – 16 gauge catheter
 For child’s / young persons age:

Age	Initial Catheter Size
<8 years old	8 Fr
8-12 years	10 Fr
>12 years old	12 Fr

- b) All spinal cord injured patients must be referred to the urology team with 24hours of admission to hospital.
- c) In-dwelling catheters should be maintained on free drainage and changed as required / as per individual hospital protocol
- d) Changes to ongoing bladder management should be discussed with your local SCIC and the urology team and an individualised bladder care programme in relation to their injury agreed

Exceptions: There are no exceptions unless on the advice of the SCIC or urology team.

Element 7: Thromboembolic Protection

Rationale:

Enforced bed rest and systemic paralysis increases the risk of thromboembolism. To prevent deep vein thrombosis or pulmonary embolus, anticoagulation therapy must be appropriately established.

- a) All spinal cord injured patients **over the age of 12 years**, must be fitted with properly sized TED stockings unless leg damage precludes. Once per shift TED stockings should be entirely removed to check skin integrity and pressure areas
- b) Foot pumps or compression boots can be used, but it is important to monitor the pressure effect on the skin
- c) Pharmacological management should commence when advised by managing clinician to do so, preferably within 48hrs. The need to commence should be discussed on the daily ward rounds
- d) Physiotherapist input should be sought with a view to providing an assessment of joint range and passive/ active assisted movements
- e) Cannulae should be removed as soon as they are no longer clinically indicated. This will minimise the risk of thrombophlebitis and thrombus

Exceptions:

- Do not apply TED stockings if the patient has lower limb external fixators, wounds, pressure ulcers, arterial disease or dermatological conditions
- Anti-coagulations must be prescribed at the spinal surgeon's directive. They should not be used if contra-indicated.

Element 8: Cardiovascular Management and Temperature Regulation

Rationale:

Spinal cord injured patients can present with spinal shock which may compromise their cardiovascular status and stability. The underlying issue is the loss of functioning baroreceptor reflex and basal sympathetic tone in high spinal cord lesions – for this purpose all cervical and upper thoracic (above T6/7) cases will have a potential problem with bradycardia, hypotension and unopposed vaso-vagal reflex in response to tracheal stimulus. This applies to those without cardiac sympathetic innervation i.e. T2 – T4/5. Be aware that log-rolling or repositioning may also cause vaso-vagal stimulation.

Spinal cord injured patients are not able to internally regulate their body temperature, dependent on the level and extent of injury.

- a) Ensure that a prescription for Glycopyrolate is documented on the drug chart for use in the event of cardiac syncope or if the heart rate drops to below 35 bpm. [For child / young person ensure that a prescription for atropine is documented on the drug Kardex for use if the heart rate drops to below 60bpm.](#) Consider the need for the patient to be in an enhanced level care bed for close/continuous monitoring
- b) Intravenous fluids should be administered cautiously, under the advice of the attending clinician in order to prevent fluid overload. (If unsure obtain advice from a Spinal Consultant / Registrar)
- c) Monitor the patient's core temperature closely. The patients' actual body temperature can be as much as 1° below normal. Utilise body warming or cooling devices cautiously. Insulate the patient or distance paralysed areas of the body as appropriate from sources of heat or cooling
- d) Ensure that guidance and advice regarding the management of the patient is passed on during interdepartmental transfers, e.g. MRI, theatre and appropriate drugs taken for the transfer.

Exceptions: None

Element 9: Respiratory Management

Rationale:

Pulmonary complications can have a morbid impact for spinal cord injured patients. It is therefore important to work to promote respiratory monitoring, positioning, and to maximise ventilation and perfusion. Advice regarding ventilatory support and complex weaning can be gained from the linked or supporting SCIC if required.

- a) All patients should be nursed flat/supine as respiratory mechanics are maximised in the supine position for the spontaneously breathing tetraplegic patient. If necessary, following multidisciplinary discussion, the bed can be whole bed tilted no more than 15-30° head-up if this supports managing other injuries or achieving medical stability
- b) Ventilate to normal blood gas parameters unless there is chronic underlying lung morbidity. Provide humidified supplemental oxygen, particularly in the acute phase, to ensure that the cord is kept oxygenated and therefore reduce the risk of further damage
- c) It is essential to closely monitor the patient for signs of respiratory fatigue or distress, with regular monitoring, using measures such as vital capacity, oxygen saturation, hypercapnia, hypoxia, respiratory rate and pattern
- d) All patients should be referred to a physiotherapist to initiate an individualised preventative/prophylaxis regime e.g. assisted cough with devices such as NIPPY, incentive spirometry, non-invasive ventilation. They will also advise on turning and positioning to maximise V/Q (taking account of requirements regarding spinal stability, skin integrity and care). Advice regarding specific secretion clearance issues can be gained from linked SCIC if required
- e) It is the responsibility of the regional SCIC to appropriately share any referrals for an SCI Ventilatory or Weaning / Respiratory support bed to the appropriate unit early following admission

Exceptions: Head Injury, increased ICP

Link: Respiratory Information for Spinal Cord Injury risci.org.uk

Element 10: Tissue Viability

Rationale:

All spinal cord injury patients are at high risk of developing pressure ulcers so therefore require vigilant monitoring of pressure areas.

- a) An initial assessment and Waterlow / Medley score must be carried out and the findings documented in the case notes, this is a standard part of nursing admit paperwork so no need to comment further and TVN do not need to know about case unless an issue
- b) Initiate an appropriate turning / positioning regime 2 to 3 hourly 3 way turns and positioning. **Red marks are significant**; these should be palpated for hardness and kept pressure free until they are no longer visible or palpable. The key is to ensure all pressure areas are looked at, at least daily, if not on each shift. Refer to the SCIC for clarification and advice if required
- c) Monitor the patient's core temperature closely. The patients' actual body temperature can be as much as 1° below normal. Utilise body warming or cooling devices cautiously. Insulate the patient or distance paralysed areas of the body as appropriate from sources of heat or cooling
- d) If any splints, plaster casts or orthoses are to be used, observe the relevant pressure areas for signs of tissue damage at least 3 times a day and **for child / young person observe at least 3 hourly**. Obtain advice from the orthotist or the therapist regarding appropriate care and application. Liaise with orthopaedic services with regards to plaster casts. See appendix 2 for further specifics related to the use of splints
- e) If pressure area damage is noted, contact the Tissue Viability Service immediately. Document the damage in the case notes, all pressure ulcers grade 2+ should be measured and be photographed, initially and then weekly thereafter. Act immediately to relieve the pressure on the damaged area
- f) All staff must be made aware of the specific tissue viability care requirements of the spinal cord injured patient

Exceptions: None

Element 11: Management of Autonomic Dysreflexia

Rationale:

Patients with spinal cord lesions are at risk of autonomic dysreflexia after the spinal shock phase. This is a life-threatening hypertensive response to noxious stimuli.

- a) Assess the patient for risks or history of dysreflexia to include level of completeness, time since injury and previous symptoms
- b) Monitor the patient for signs of a dysreflexia episode. These may include, but are not restricted to, hypertension, bradycardia, flushed face and upper extremities, stuffy nose, pounding headache and sweating
- c) Identify the noxious stimuli. Some examples of these stimuli could be a blocked or kinked catheter, UTI, impacted bowel, ingrown toenail or pressure ulcer. Work to resolve these immediately
- d) In the first instance perform a whole bed tilt (head up) or sit the patient up if appropriate to do so, on the advice and direction of the medical clinician
- e) Inform the attending medical clinician to initiate treatment. The treatment regime would normally include:- administration of GTN spray/tablets or Nifedipine, these recommended medications should be added within the PRN section of drug prescription system/chart/documentation ideally on admission or when patient is through the spinal shock stage of their recovery
- f) Monitor cardiovascular signs continuously for resolution of the signs of dysreflexia. Maintain heightened awareness for repeat attacks. Consider requirement for an enhanced care level bed if triggering stimulus takes time to resolve
- g) Document each episode in the patient's case notes
- h) All staff responsible for caring for a SCI patient are aware of Autonomic Dysreflexia and appropriate management and for child / young person any concerns should be referred to PICU colleagues for advice**

Exceptions: None

Link: National Rehabilitation Hospital - The Mystery of Autonomic Dysreflexia Poster below can be used for display in prominent areas.

The Mystery of Autonomic Dysreflexia Poster



THE MYSTERY OF AUTONOMIC DYSREFLEXIA?



Autonomic Dysreflexia (AD) is a medical emergency specific to individuals with Spinal Cord Injury (SCI) at the neurological level of T6 or above. It is usually caused when a painful irritation occurs below the level of your spinal cord injury. It can present with a variety of signs / symptoms which can vary from mild to severe discomfort. As a SCI individual you need to have a good understanding of AD and be familiar with signs and symptoms and immediate management of this potentially life threatening condition. It must be addressed immediately because if it is untreated it may progress to cause a seizure, stroke or death. (Ahrens Prentice 1996).

CAUSES

Bladder

- Distension (due to catheter blockage or kinking)
- Urinary tract infection
- Bladder stones

Bowel

- Constipation
- Haemorrhoids
- Fissure
- Having bowel care performed

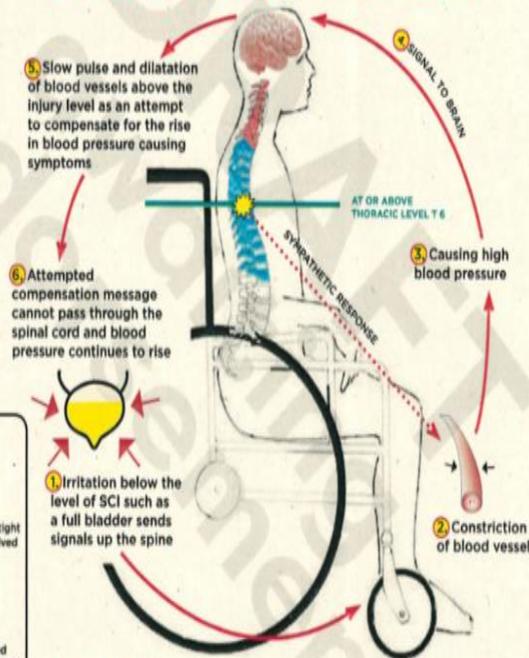
Skin

- Pressure Ulcer
- Tight Clothing
- Ingrown toenail
- Blister/burn

Others

- Scrotal compression
- Sexual stimulation
- Labour childbirth
- Menstruation and any condition that would usually cause abdominal pain

HOW DO I GET AUTONOMIC DYSREFLEXIA?



SIGNS & SYMPTOMS

BP 20-30mmHg ABOVE NORMAL	SWEATING
POUNDRING HEADACHE	FLUSHED
TIGHT CHEST & STUFFY NOSE	BLURRED VISION

Emergency Treatment for Autonomic Dysreflexia

Signs / Symptoms of Autonomic Dysreflexia

Call for assistance - Sit upright and lower legs - Loosen any tight clothing / legs straps - Monitor BP until symptoms have resolved

Common causes to exclude / treat first are:

1. Bladder Distension - 2. Constipation

If symptoms persist and cause is unknown - Take prescribed medication - Nifedipine 10mg capsule "bite and swallow" method

If BP not settling and cause not identified Contact your GP or Accident / Emergency Department

CONCLUSION

It is essential for you, family members or carers to recognise and understand the potential causes, prevention and treatment of AD. If an episode of AD is identified quickly, and treated immediately the symptoms may then subside, thus removing the likelihood of complications.

An outreach visit may be necessary to assess the patient prior to acceptance for admission to the SCIC. The visits are often done by a Consultant Nurse or Outreach Coordinator.

The outreach team are also available to help support staff with the patients care and even provide expert training where required.

They will ensure the patient is assessed and fully understands their injury and will let them know what treatment / rehabilitation pathway they are likely to follow.

They can meet with family and carers of the patient to offer them support and advice, usually contacted via the unit switchboard at The Robert Jones and Agnes Hunt Hospital.

NB Patients from Kettering / Northampton should be referred to The National Spinal Cord Injury Centre at Stoke Mandeville Hospital.

The SCI Consultant Nurse or Outreach Coordinator will clearly document in the medical notes or on the electronic noting system when a referral has been shared with another specialist SCI unit.

It is also important for a date of acceptance to be documented in the medical notes/electronic noting system.

For support with Paediatric referrals please contact: Major Trauma Coordination Team at BCH on 07785238619 / 07341109712 or on bwc.bchmajortrauma@nhs.net

Abbreviations

SCI Spinal Cord Injury

SCIC	Spinal Cord Injury Centre
TED	Thromboembolism-deterrent
TU	Trauma Unit
MTC	Major Trauma Centre
ASIA	American Spinal Injury Association
ED	Emergency Department

Acknowledgments

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2021 - Birmingham Children's Hospital Spinal Cord Injury Group

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- Mr William Lo – Consultant Neurosurgeon
- Dr Adrian Plunkett – Consultant Intensivist
- Dr Richard Neal - Consultant Intensivist
- Mr Andy Robb – Consultant Urologist
- Dr Isobel Brookes – Respiratory Consultant
- Dr Tina Newton – Consultant in Paediatric Emergency Medicine / Clinical Lead for Major Trauma
- Elizabeth Wright – Principal Physiotherapist in Neurosciences
- Claire Rylance – Advanced Physiotherapist in Neurosciences
- Cara Alexander – Advanced Physiotherapist in Respiratory
- Sian Phillips – Occupational Therapist
- Tracey Rowberry – ANP PICU

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Foster NA et al, The Spine Journal 14 (2014), 1147-1154

www.england.nhs.uk/publication/spinal-cord-injury-services-all-ages

American Spinal Injury Association

National Rehabilitation Hospital

Respiratory Information for Spinal Cord Injury

Multidisciplinary Association for Spinal Cord Injury Professionals

Appendix 1 – Example 24-hour check list for Adults

Consider the use of a 24-hour check list or equivalent to ensure urgent aspects of all the above elements have been initiated.

Patient Address Label

24 Hour Check List

Please Tick

Sign & Print Name

- | | | |
|--------------------------|--|-------|
| <input type="checkbox"/> | Appropriate Spinal Imaging completed | _____ |
| <input type="checkbox"/> | Refer to a Spinal Cord Injury Centre | _____ |
| <input type="checkbox"/> | Turning Regime initiated within 3 hours | _____ |
| <input type="checkbox"/> | Commence on gastrointestinal protection | _____ |
| <input type="checkbox"/> | Refer to a Dietician | _____ |
| <input type="checkbox"/> | Appropriate collar care / spinal brace completed | _____ |
| <input type="checkbox"/> | Refer to Urology Team | _____ |
| <input type="checkbox"/> | Bowel program initiated | _____ |
| <input type="checkbox"/> | Catheterise Patient | _____ |
| <input type="checkbox"/> | Put on thigh leg TED stocking | _____ |

Is there a need to transfer the patient? No

Yes

Contact Trauma and Rehabilitation Co-ordinator bwc.bchmajortrauma@nhs.net

Refer to Neuro rehabilitation Team

PLEASE FILE IN THE PATIENTS NOTES and ENSURE A COPY ACCOMPANIES THE PATIENT TO THEIR RECEIVING HOSPITAL

Appendix 2 – Log Rolling / Positioning and Putting on Foot & Hand Splint Pictures

ACUTE TETRAPLEGIC SPINAL LOGROLL – Method 1

During an acute tetraplegic logroll the patient's head and vertebral column must be kept in alignment when rolling from supine to side-lying and vice versa. During this manoeuvre the alignment of the vertebral column and the body as a whole is maintained through the manual support provided by the turning team. (1st assistant – Team leader & acute head hold in accordance with adapted ATLS procedure; 2nd assistant – shoulder level; 3rd assistant – hip level; 4th assistant – lower leg level; 5th assistant – operating the bed controls, supporting arms, checking patient's skin, placing pillows in situ etc)



1 Logrolling on a trolley in the Emergency Department or within a ward setting on a normal hospital bed or tilt and turn bed is essential to enable examination of the back and necessary for relieving pressure on the skin, hygiene, bowel care and postural chest drainage. The following technique is applicable in all clinical settings.



2 Team leader undertakes acute initial head hold in accordance with adapted ATLS procedure. 5th assistant passively positions patient's arms across chest but above diaphragm. This is important as the arms are paralysed and may fall down causing injury to the shoulder joint.



3 2nd assistant reaches over patient. First hand on shoulder and second hand on top of hip. 5th assistant supports patient's arm during this action.



4 3rd assistant positions hands. First hand at hip level alongside the 2nd assistant, and second hand underneath furthest thigh.



5 4th assistant positions hands. First hand under the knee of the furthest leg, and second hand under the ankle of the same leg.



6 Close up of hand positions – ensure all parties are in contact with the patient's natural skeletal landmarks and not just adipose tissue.

ACUTE PARAPLEGIC SPINAL LOGROLL

Logrolling of SCI patients occurs with some frequency in a ward setting. Logrolling is necessary for relieving pressure on the skin, medical examination, postural chest drainage, physiotherapy, routine hygiene and bowel care. Where appropriate, some of the physical effort associated with the manual logroll can be reduced through the use of a mechanical turning bed. (1st assistant – Team leader; 2nd assistant – shoulder level; 3rd assistant – hip level; 4th assistant – lower leg level; 5th assistant – operating the bed controls, supporting arms, checking patient's skin, placing pillows in situ etc)



1 Logrolling of acute paraplegic patients in whom the possibility of accompanying cervical spinal injury has been excluded. Following a risk assessment a single pillow under the head may be used particularly for patients demonstrating spondylitis. This logroll requires only 4 members of staff as the patient is able to support and control his own head movements although extreme cervical flexion or sudden rotation of the head should be discouraged as these may cause pain at the injury site in patients with upper thoracic injuries.



2 Positioning of hands is important and utilises natural skeletal landmarks for security of hold and patient comfort. 1st assistant reaches over patient. First hand on shoulder and second hand on top of hip. 2nd assistant positions hands. First hand at hip level alongside 1st assistant and second hand underneath furthest thigh. 3rd assistant position hands. First hand under the knee of the furthest leg, and second hand under the ankle of the same leg.



3 Following the logroll, the patient's upper leg must be kept in alignment with the lower leg throughout the turn to prevent any flexion movement being relayed to the thoraco-lumbar spine. To maintain lateral alignment, the outer malleolus should be maintained at a height level with the upper trochanter.



4 Logrolling within a ward setting is necessary for relieving pressure on the skin, hygiene and bowel care.



5 With patient supported in a logroll one pillow is positioned to support the patient's back.



6 Two pillows are positioned to support the upper leg in a side-lying position.



7 Legs are positioned to prevent hyperextension of the knees, a bed end is placed in situ and additional pillows placed at the end of the bed to support the patient's feet in neutral to prevent foot drop. The heels are left 'floating' free from pressure to prevent skin breakdown.

Neutral Supine / On Back



Complete manual turns to relieve pressure Areas

Shoulder release



Hand positions



Neutral support of foot with no pressure on the heel



- Use rolled blankets to support the trunk in midline
- Place one flat pillow/folded blanket under legs width ways, ensure the heels are free from pressure
- You may use a rolled towel between knees if they roll together
- Place a roll to prop up feet and keep heels clear of the bed if not wearing splints
- Position upper limbs as shown, supported on a pillow with a small roll to support the wrist and arches of the hand

Side lying

- Use a large roll behind the head and down the length of the spine, for larger patients you may need multiple blankets to achieve this
- Use a pillow or roll to support the uppermost arm and position the hands as shown
- A pillow with a roll underneath, under the top leg prevents rotation of the pelvis forwards.
- Pillows to support the feet, should allow for the heels to be off the bed, to reduce risk of pressure areas.
- Rotation of the body to 90 degrees is preferred for acute patients.



Please check with Neuro-surgical team that they are happy with the patient being positioned in side lying. Once agreed they should alternate between back and sides every 2-4 hours.

Hand and Foot Range of Movement

Foot stretches



Slowly point the toes and then bring them upwards as shown in the photo.

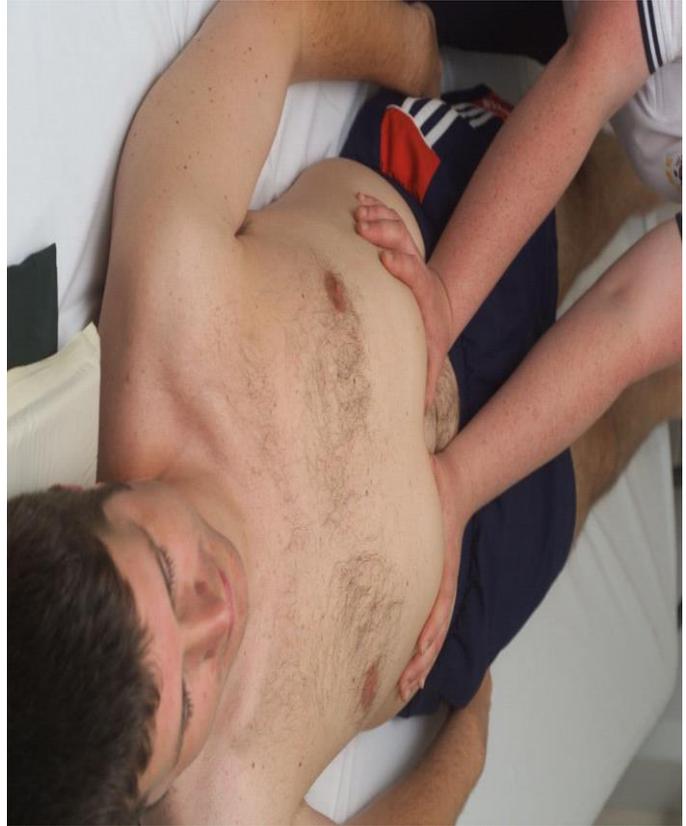
Hold with toes upwards for 15-20 seconds and repeat 10 times.

Hand stretches



Support the forearm and wrist. Slowly bring the wrist upwards, hold for 15-20 seconds and then move it downwards again holding the stretch for 15-20 seconds and repeat 10 times

Example of manual assisted cough technique



Putting on Foot and Hand Splints

PRAFO's (soft splints)



Stretch the ankle as shown and slide into the splint making sure the heel is at the back. Fasten the ankle strap first.



The stability bar helps the leg stay in neutral. Useful when patient is in supine. Tuck this in when the patient is in side lying.

AFO's (plastic splints)



Stretch the ankle as shown then slide the heel into the back of the splint whilst maintaining the ankle position.



Hold the front of the foot steady and fasten the ankle strap first. Then secure the top strap and toe strap.

Hand splints

If your patient has been provided with hand splints fit by placing the hand as shown and then fastening all the soft straps as per the picture opposite ensuring the fingers and thumb are flat and not curled



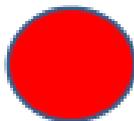
Appendix 3 – Supporting Services Links

- MASCIP www.mascip.co.uk
- RISCI www.risci.org.uk
- SIA www.spinal.co.uk
- After Trauma www.aftertrauma.org
- BACKUP www.backuptrust.org.uk
- Headway www.headway.org.uk
- ASPIRE www.aspire.org.uk

Appendix 4 - Suspect Spinal Damage? Poster



SUSPECT SPINAL DAMAGE?



THINK Spinal Shock

- Bradycardia & Hypotension - Do not over hydrate
- Absent or sluggish bowel sounds – Do not feed
- ? Altered breathing pattern or poor cough effort – *DO* consider critical care review & enhanced care bed



THINK Spine

- Keep flat & implement spinal precautions
- Full neurological assessment
- Spinal imaging
- Diagnosis of spinal cord injury



ACTION

- Refer immediately to spinal cord injury centre
- Skin integrity – How long have they been supine?!
- Insert urinary catheter
- Refer to network best practice guidelines and local pathways

Midlands Centre for Spinal Injuries: 01691 404406

Other useful contacts:

Database link: www.mdsas.nhs.uk/Spinal

Appendix 5 – SCIC Admission & Transfer Criteria's for Oswestry / Stoke Mandeville / Sheffield / Southport

Midland Centre for Spinal Injuries (Oswestry)

Criteria for Acute Admission

A spinal cord injury is damage to the spinal cord or column which often causes permanent disability or loss of movement (paralysis) and sensation below the site of the injury.

The MCSI is a supraregional centre for the management of spinal cord injuries, receiving patients from acute hospitals that fall into the following criteria

1. All patients with spinal trauma with neurological deficit.
2. Patients with spinal trauma, without neurological deficit but with an unstable spine where the admitting hospitals are unable to manage.
3. Patients with spinal paralysis of non-traumatic origin and non-progressive in nature

Considerations when accepting for admission

1. General condition of the patient
Any problems identified at time of referral the generic form should be completed reviewing specifically mental health problems, personality problems, dementia and potential for rehabilitation.
2. Chest
3. If the referring hospital gives enough information on the condition of the patient immediately add to the waiting list, if there are any concerns and the patient will be visited in the referring hospital to make a decision about suitability for admission.
4. Patients who require longer term tracheostomy should be downsized to a maximum of a size 6 uncuffed tube before transfer (and have been stable with this for a minimum of 5 days).
5. Patients not fit for transfer e.g. ventilated will be put on hold until their condition improves.

NOTE RE: TRANSFER OF PATIENTS WITH A TRACHEOSTOMY – the patient must be decannulated, clinically well and have had a chest x ray, ABGs and full set of bloods before being considered for transfer.

Updated April 2018

Stoke Mandeville

Criteria for Non-Acceptance

1. Patients with injury to spinal column but intact neurology.
2. People with progressive disease. Explanatory Note: Spinal tumours are classified as Specialised Cancer Services, not Specialised SCI. However if spinal cord dysfunction has arisen from the effects of a benign tumour which has been primarily dealt with by an appropriate specialty, or from a tumour which has been adequately treated and is now deemed to have a benign cause, or if the patient has a significant life expectancy, the patient may transfer to the Spinal Cord Injury Service for rehabilitation and life-long follow up. At this point they will come under the scope of Specialised SCI.
3. Life limited condition (<1yr).
4. Severe cognitive/behavioural impairment which limits an individual's capacity to engage in the goal planning and rehabilitation process fully.
5. Severe risk of self-harm to themselves and to others.
6. Severe co-morbidities – which will limit their rehabilitation potential and their ability to tolerate a full and active rehabilitation program.
7. Behavioural issues that pose risk to others/evidence of non-compliance to treatment – that contradicts Trust Behavioural Policies.

Southport & Ormskirk NHS Trust

1. People who have suffered a new SCI or Cauda Equina Syndrome as a result of trauma. Eg – RTA, Falls, Sporting Injury, Acts of violence, Iatrogenic causes - post surgical complications – degenerative disease, aortic aneurism etc (list not meant to be exhaustive).
2. People who have suffered a new SCI or Cauda Equina Syndrome as a result of a non-traumatic cause.
*All of the above should be of a non-progressive aetiology

Conditions excluded from admission criteria

1. People with progressive neurological conditions
2. People with congenital neurological conditions
3. People who have a supraspinal aetiology.
4. People with significant mental health issues, brain injuries or cognitive difficulties
5. People who require ongoing renal support or have ongoing treatment priorities which are a barrier to rehabilitation

Patient Name _____ Date/Time of Exam _____
 Examiner Name _____ Signature _____

RIGHT

MOTOR KEY MUSCLES

Light Touch (LTR) Pin Prick (PPR)

Elbow flexors	C5	C2
Wrist extensors	C6	C3
Elbow extensors	C7	C4
Finger flexors	C8	
Finger abductors (little finger)	T1	
	T2	
	T3	
	T4	
	T5	
	T6	
	T7	
	T8	
	T9	
	T10	
	T11	
	T12	

Comments (Non-Key Muscle? Reason for NT? Pain? Non-SCI condition?):

UER (Upper Extremity Right)

LER (Lower Extremity Right)

Knee extensors L2
 Ankle dorsiflexors L4
 Long toe extensors L5
 Ankle plantar flexors S1

(VAC) Voluntary Anal Contraction (Yes/No)

RIGHT TOTALS (MAXIMUM)

UER	+UEL	= UEMS TOTAL	LER	+LEL	= LEMS TOTAL
(25)	(25)	(50)	(25)	(25)	(50)

SENSORY KEY SENSORY POINTS

Light Touch (LTR) Pin Prick (PPR)

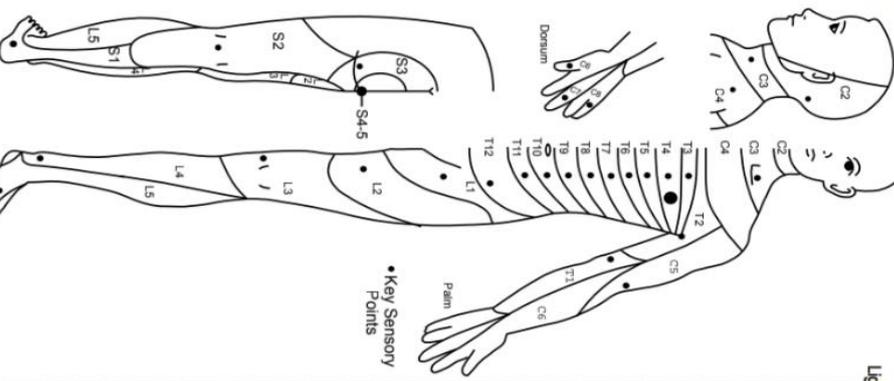
C2	C3	C4	C5	C6	C7	C8	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	L1	L2	L3	L4	L5	S1	S2	S3	S4-5
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	----	----	----	----	----	----	----	----	------

(SCORING ON REVERSE SIDE)

- 0 = Total paralysis
- 1 = Palpable or visible contraction
- 2 = Active movement, gravity eliminated
- 3 = Active movement, against gravity
- 4 = Active movement, against some resistance
- 5 = Active movement, against full resistance
- NT = Not testable
- 0*, 1*, 2*, 3*, 4*, NT* = Non-SCI condition present

SENSORY (SCORING ON REVERSE SIDE)

- 0 = Absent
- NT = Not testable
- 1 = Altered
- 0*, 1*, NT* = Non-SCI condition present
- 2 = Normal



LEFT TOTALS (MAXIMUM)

LTR	+LTL	= LT TOTAL	PPR	+PPL	= PP TOTAL
(56)	(56)	(112)	(56)	(56)	(112)

MOTOR SUBSCORES

NEUROLOGICAL LEVELS

1. SENSORY R L

2. MOTOR R L

3. NEUROLOGICAL LEVEL OF INJURY (NLI)

4. COMPLETE OR INCOMPLETE? (In injuries with absent motor OR sensory function in S4-5 only)

6. ZONE OF PARTIAL PRESERVATION MOTOR

R L

Appendix 6 – ASIA Chart and Explanatory Notes

Muscle Function Grading

0 = Total paralysis

1 = Palpable or visible contraction

2 = Active movement, full range of motion (ROM) with gravity eliminated

3 = Active movement, full ROM against gravity

4 = Active movement, full ROM against gravity and moderate resistance in a muscle specific position

5 = (Normal) active movement, full ROM against gravity and full resistance in a functional muscle position expected from an otherwise unimpaired person

NT = Not testable (i.e. due to immobilization, severe pain such that the patient cannot be graded, amputation of limb, or contracture of > 50% of the normal ROM)

0*, 1*, 2*, 3*, 4*, NT* = Non-SCI condition present *

Sensory Grading

0 = Absent 1 = Altered, either decreased/impaired sensation or hypersensitivity

2 = Normal NT = Not testable

0*, 1*, NT* = Non-SCI condition present *

Note: Abnormal motor and sensory scores should be tagged with a "" to indicate an impairment due to a non-SCI condition. The non-SCI condition should be explained in the comments box together with information about how the score is rated for classification purposes (at least normal / not normal for classification).

When to Test Non-Key Muscles:

In a patient with an apparent AIS B classification, non-key muscle functions more than 3 levels below the motor level on each side should be tested to most accurately classify the injury (differentiate between AIS B and C).

Movement	Root level
Shoulder: Flexion, extension, adduction, abduction, internal and external rotation	C5
Elbow: Supination	
Elbow: Pronation	C6
Wrist: Flexion	
Finger: Flexion at proximal joint, extension	C7
Thumb: Flexion, extension and abduction in plane of thumb	
Finger: Flexion at MCP joint	C8
Thumb: Opposition, adduction and abduction perpendicular to palm	
Finger: Abduction of the index finger	T1
Hip: Adduction	L2
Hip: External rotation	L3
Hip: Extension, abduction, internal rotation	
Knee: Flexion	L4
Ankle: Inversion and eversion	
Toe: MP and IP extension	
Hallux and Toe: DIP and PIP flexion and abduction	L5
Hallux: Adduction	S1

ASIA Impairment Scale (AIS)

A = Complete. No sensory or motor function is preserved in the sacral segments S4-5.

B = Sensory Incomplete. Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-5 (light touch or pin prick at S4-5 or deep anal pressure) AND no motor function is preserved more than three levels below the motor level on either side of the body.

C = Motor Incomplete. Motor function is preserved at the most caudal sacral segments for voluntary anal contraction (VAC) OR the patient meets the criteria for sensory incomplete status (sensory function preserved at the most caudal sacral segments S4-5 by LT, PP or DAP), and has some sparing of motor function more than three levels below the ipsilateral motor level on either side of the body. (This includes key or non-key muscle functions to determine motor incomplete status.) For AIS C – less than half of key muscle functions below the single NLI have a muscle grade ≥ 3 .

D = Motor Incomplete. Motor incomplete status as defined above, with at least half (half or more) of key muscle functions below the single NLI having a muscle grade ≥ 3 .

E = Normal. If sensation and motor function as tested with the ISNCSCI are graded as normal in all segments, and the patient had prior deficits, then the AIS grade is E. Someone without an initial SCI does not receive an AIS grade.

Using ND: To document the sensory, motor and NLI levels, the ASIA Impairment Scale grade, and/or the zone of partial preservation (ZPP) when they are unable to be determined based on the examination results.



Steps in Classification

The following order is recommended for determining the classification of individuals with SCI.

1. Determine sensory levels for right and left sides.

The sensory level is the most caudal, intact dermatome for both pin prick and light touch sensation.

2. Determine motor levels for right and left sides.

Defined by the lowest key muscle function that has a grade of at least 3 (on supine testing), providing the key muscle functions represented by segments above that level are judged to be intact (graded as a 5).

Note: in regions where there is no myotome to test, the motor level is presumed to be the same as the sensory level, if testable motor function above that level is also normal.

3. Determine the neurological level of injury (NLI).

This refers to the most caudal segment of the cord with intact sensation and antigravity (3 or more) muscle function strength, provided that there is normal (intact) sensory and motor function rostrally respectively.

The NLI is the most cephalad of the sensory and motor levels determined in steps 1 and 2.

4. Determine whether the injury is Complete or Incomplete.

(i.e. absence or presence of sacral sparing)

If voluntary anal contraction = No AND all S4-5 sensory scores = 0

AND deep anal pressure = No, then injury is Complete.

Otherwise, injury is Incomplete.

5. Determine ASIA Impairment Scale (AIS) Grade.

Is injury Complete? If YES, AIS=A

NO ↓

Is injury Motor Complete? If YES, AIS=B

NO ↓

(No=voluntary anal contraction OR motor function more than three levels below the motor level on a given side, if the patient has sensory incomplete classification)

Are at least half (half or more) of the key muscles below the neurological level of injury graded 3 or better?

NO ↓
AIS=C

YES ↓
AIS=D

If sensation and motor function is normal in all segments, AIS=E

Note: AIS E is used in follow-up testing when an individual with a documented SCI has recovered normal function. If at initial testing no deficits are found, the individual is neurologically intact and the ASIA Impairment Scale does not apply.

6. Determine the zone of partial preservation (ZPP).

The ZPP is used only in injuries with absent motor (no VAC) OR sensory function (no DAP, no LT and no PP sensation) in the lowest sacral segments S4-5, and refers to those dermatomes and myotomes caudal to the sensory and motor levels that remain partially innervated. With sacral sparing of sensory function, the sensory ZPP is not applicable and therefore "NA" is recorded in the block of the worksheet. Accordingly, if VAC is present, the motor ZPP is not applicable and is noted as "NA".

Feedback to the Network

It is very important to us that we know what you think about this best practice guide so that we can continue to ensure that it is useful and includes information that is relevant and up to date.

If you have used the best practice guide, please could you take some time to feedback your comments and suggestions. Please email Trauma.mcctn@nhs.net