

# SESLHD PROCEDURE COVER SHEET



**Health**  
South Eastern Sydney  
Local Health District

<b>NAME OF DOCUMENT</b>	Acute Spinal Cord Injury of the Adult – Management and Referral Procedure
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<b>FORMER REFERENCE(S)</b>	PD 162 Acute Spinal Cord Injury of the Adult – Management of
<b>EXECUTIVE SPONSOR or EXECUTIVE CLINICAL SPONSOR</b>	SESLHD Clinical Stream Director, Critical Care
<b>AUTHOR</b>	Dr Ralph Stanford Staff Specialist / Orthopaedic Surgeon Prince of Wales Hospital
<b>POSITION RESPONSIBLE FOR THE DOCUMENT</b>	Kelsey Langley Acting CNC Trauma & P.A.R.T.Y SESLHD <a href="mailto:Kelsey.langley@health.nsw.gov.au">Kelsey.langley@health.nsw.gov.au</a>
<b>FUNCTIONAL GROUP(S)</b>	Critical Care and Emergency Medicine
<b>KEY TERMS</b>	Acute Spinal Cord Injury, Spinal Cord Injury Service
<b>SUMMARY</b>	Procedure for the transfer of <b>Adults</b> , (16years or older), with acute spinal cord injury to the Major Trauma Service and/or to the Spinal Cord Injury Service (SCIS) for South Eastern Sydney Local Health District (SESLHD) and its referral network.

## **COMPLIANCE WITH THIS DOCUMENT IS MANDATORY**

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### 1. POLICY STATEMENT

Early referral and transfer of patients with spinal cord injury (SCI) to a specialised Spinal Cord Injury Service (SCIS) improves outcomes and reduces major complications. This is in line with the [NSW Health Policy Directive PD2018\\_011 - Critical Care Tertiary Referral Networks and Transfer of Care \(ADULTS\), Improving the Quality of Trauma Care in NSW: Trauma Services Model of Care \(2019\)](#) and [Selected Specialty and Statewide Service Plans, NSW Trauma Services Number Six, December 2009](#). The purpose of this procedure is to ensure patients with SCI are able to access speciality SCIS when needed. Admission should be timely and equitable. It is recommended that a direct admission occurring within 24hrs of injury will potentially improve outcomes with early access to surgical decompression.

### 2. BACKGROUND

The NSW State Spinal Cord Injury Service for **adults (16 years or older)** is co-located at Prince of Wales Hospital (POWH) and Royal North Shore Hospital (RNSH). This is a tertiary level service that delivers multidisciplinary care in an appropriate physical environment as required by the NSW Health Model of Care for SCI. This combination of expertise is not available at or transferable to other sites and so transport of patients to one of the SCIS hospitals is required.

#### 2.1 Acute spinal cord injury

The rapid deterioration in neurological function due to injury of the spinal cord or cauda equina (covering neurological segments C1 to S5) from non-progressive disease, including trauma, intervertebral disc herniation, transverse myelitis, bacterial infection, ischaemia or haematoma. Progressive neurological disorders and metastatic neoplastic disease are specifically excluded. Unilateral injury to single nerve roots (sciatica or brachialgia) is not included in the definition of spinal cord injury.

#### 2.2 The Spinal Cord Injury Service (SCIS) at POWH (call 9382 2222 and speak to the spinal surgeon on call)

The POWH SCIS is the default service to provide immediate and continuing care for acute spinal cord injured patients from within SESLHD and its referral network within NSW. Referring Local Health Districts include:

- South Eastern Sydney
- Illawarra Shoalhaven
- Murrumbidgee
- Southern NSW
- South Western Sydney
- Sydney
- Australian Capital Territory (ACT)
- St Vincent's Health Network

**Acute Spinal Cord Injury of the Adult –  
Management and Referral Procedure****SESLHDPR/291****2.3 Non-refusal policy at POWH**

The SCIS at POWH is bound to accept any appropriate referral of acute spinal cord injury that is notified within 24 hours of the injury occurring. Referrals to POWH later than 24 hours after the onset of SCI will be accommodated at the earliest possible opportunity based on availability of appropriate resources within the hospital. Spinal Cord Injury Without Radiological Abnormality (SCIWORA) patients should also be considered for urgent transfer to POWH for ongoing injury management.

It is not expected that POWH will be mandated to accept all referrals of SCI, in some circumstances transfer of the patient may not be appropriate. In cases where a bed is not available at POWH SCIS, the spinal surgeon on call will liaise with RNSH for admission of the patient.

**2.4 Appropriate Referral Type (call 9382 2222 and speak to the spinal surgeon on call)**

The SCIS at POWH will accept patients with the following clinical characteristics:

- Age 16 years or older
- Sudden onset of neurological deficit affecting spinal segments from C1 to S5 (but not unilateral, single nerve root compromise)
- Presentation following trauma or presumed non-progressive pathology
- Has a reasonable expectation of surviving the acute injury and/or medical co-morbidities
- Spinal cord and spinal column imaging are not required prior to referral or transfer.

**Patients with the following characteristics will not be accepted**

- Age younger than 16 years (refer to Sydney Children's Hospital Network at Randwick or Westmead)
- Moribund patients or patients with such severe injury as to put their immediate survival at risk
- Patients with documented or presumed progressive pathology affecting the spinal cord or cauda equina (demyelinating and degenerative conditions of the spinal cord, metastatic tumours or congenital disorders).

**2.5 Network SCIS and Major Trauma Service SESLHD**

The SCIS at POWH is networked with the Major Trauma Service at St George Hospital in SESLHD. The SCIS at POWH will be the primary referral centre for SCI patients referred to the Trauma Service at St George Hospital and will provide a non-refusal service to such patients. Referral of multisystem injured patients with SCI to St George Hospital is appropriate for triage directly to the most appropriate service (the Trauma Service or SCIS).

[SESLHDPR/381 - St George Trauma Hotline Use and Referral Procedure](#)

**2.5.1 St Vincent's Hospital Sydney Major Trauma Service**

Major trauma patients presenting to St Vincent's Hospital with multisystem injuries including SCI will be discussed with the Neurosurgical service in-house to determine

**Acute Spinal Cord Injury of the Adult –  
Management and Referral Procedure****SESLHDPR/291**

appropriate transfer based on factors including severity of spinal injury, other significant & unstable injuries as well as haemodynamic stability for transfer to a spinal unit. In such circumstances, these major trauma cases would be discussed with Royal North Shore Hospital which has both a Trauma Service and SCI Unit.

**2.6 NSW Aeromedical and Medical Retrieval Service (AMRS)**

The need for physician-assisted transfer is determined by AMRS in consultation with the receiving SCIS and ICU. Transfer will generally require medically supervised transport which may be via AMRS. AMRS should be contacted on **1800 650 004** by the referring hospital to facilitate the medical retrieval of adults with an acute spinal cord injury.

**3. RESPONSIBILITIES****3.1 Referring clinicians:**

- Refer cases of acute spinal cord injury at the time of diagnosis without delay
- Seek advice from the SCIS at POWH (**call 9382 2222 and speak to the spinal surgeon on call**) if uncertain of the appropriateness of referral
- Ensure adequate spinal precautions are implemented – lay flat and attend full spinal log roll
- Ensure adequate management of airway and ventilation in cases of cervical spinal cord injury
- Complete the Spinal Cord Injury Referral and Transfer form to accompany the patient, see Appendix 2
- Ensure that any imaging studies performed are sent with the patient
- Contact AMRS to arrange patient transfer.

**3.2 Trauma Consultant/Fellow at St George Hospital:**

- Assess referred cases for physiological stability
- May refer cases of multisystem trauma with SCI that require major intervention for non-spinal injuries to RNSH (evidence of motor and /or sensory deficit is required, paraesthesia alone is not sufficient evidence of spinal cord injury)
- May accept cases of multisystem trauma with life-threatening injuries for immediate trauma care at St George Hospital trauma service
- Refer patients with isolated SCI or SCI with associated minor injuries or who have been stabilised following multi-system injury to POWH SCIS.
- If the patient is coming to SGH ED, pre-notify the SGH ED admitting officer on 9113 1744 prior to the patient's arrival with an outline of the patients' condition, plan and ETA

**3.3 Spinal Surgeon at POWH Spinal Cord Injury Service:**

- Assess referred cases for suitability for transfer to the SCIS
- Discuss referral with the consultant on-duty in POWH ICU and the on-call POWH spinal rehabilitation specialist

**Acute Spinal Cord Injury of the Adult –  
Management and Referral Procedure****SESLHDPR/291**

- Use the POWH SCIS 'Non-Refusal' policy to accept urgent appropriate referrals or otherwise determine an appropriate time of patient transfer
- Establish suitable plan of management if delays in transfer are expected
- Liaise with the SCIS at Royal North Shore Hospital in the event that POWH does not have sufficient resources to accept the patient at the time of referral.

**3.4 Receiving Spinal Surgical Team at POWH:**

- Notify POWH Emergency Department (ED) of the expected arrival of the patient
- Arrange for a 'trauma call' on all cases of post-traumatic SCI
- Arrange for an appropriate in-patient bed for the patient
- Review the patient in the ED within 30 minutes of arrival at POWH
- Notify the Spinal Rehabilitation team of the arrival of the patient.

**3.5 Receiving Spinal Rehabilitation Team at POWH:**

- Review the patient within 12 hours of arrival at POWH.

**4. PROCEDURE**

See flow chart in Appendix 1.

**5. DOCUMENTATION**

Acute Spinal Cord Injury Referral and Transfer Form and Neurological Assessment Form (see Appendix 2).

**6. MANAGEMENT**

- Remove from spinal board
- Replace rigid collar with semi-rigid (Miami-J or Philadelphia) collar
- Keep nil by mouth
- Insert urinary catheter
- Maintain mean arterial blood pressure above 80mmHg where possible
- Controlled turn every two hours for pressure area care, maintaining spinal precautions at all times
- Collar care - Appropriate hygiene and product cleaning are an important part of a patient's recovery. In addition, it will keep the patient clean, comfortable and prevent skin irritation and pressure injuries.
- Skin care and pressure area inspection is to occur twice a day. Refer to [SGH-TSH BR797 - Cervical Collar And Spinal Brace – Management And Care Of A Patient Requiring A](#)
- Minimum hourly observations, or more frequent if clinically indicated
- Monitor ventilation if there is injury at the level of the cervical spine:
  - Look for respiratory distress
  - Check oxygen saturation and/or serial arterial blood gases
  - Measure vital capacity

# SESLHD PROCEDURE

## Acute Spinal Cord Injury of the Adult – Management and Referral Procedure

SESLHDPR/291

- Consider intubation and ventilation if oxygen saturation falls, CO<sub>2</sub> levels rise or vital capacity is falling.

### 7. AUDIT

Annual analysis of the Spinal Cord Injury Database held jointly between POWH and Royal North Shore Hospital. This database will capture all cases of spinal cord injury in NSW and allows analysis of referral times.

### 8. REFERENCES

1. [NSW Ministry of Health 'Selected Specialty and Statewide Service Plans: NSW Trauma Services' \(Number 6\) December 2009](#)
2. [NSW Ministry of Health Policy Directive PD2018\\_011 - Critical Care Tertiary Referral Networks and Transfer of Care \(ADULTS\)](#)
3. [Improving the Quality of Trauma Care in NSW: Trauma Services Model of Care \(2019\)](#)
4. Parent S. Barchi S. LeBreton M. Casha S. Fehlings MG (2011) The impact of specialised centers of care for spinal cord injury on length of stay, complications, and mortality: a systematic review of the literature. *Journal of Neurotrauma*. 28(8):1363-70.
5. Middleton PM; Davies SR; Anand S; Reinten-Reynolds T; Marial O; Middleton JW. (2012) The pre-hospital epidemiology and management of spinal cord injuries in New South Wales: 2004–2008. *Injury, Int. J. Care Injured* (43) 480–485.
6. Maharaj MM, Stanford RE, Lee BB, Mobbs RJ, Marial O, Schiller M, Toson B. The effects of early or direct admission to a specialised spinal injury unit on outcomes after acute traumatic spinal cord injury. *Spinal Cord*. 2017 May;55(5):518-524. doi: 10.1038/sc.2016.117. Epub 2016 Aug 2. PMID: 27481092.
7. Slade S. Evidence Summary. Spinal cord injuries: Pressure lifting – pressure reducing techniques. The JBI EBP Database. 2021; JBI-ES-3246-2.

### 9. REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
May 2013	1	Revised by Leanne Horvat, Clinical Stream Nurse Manager, Medicine, Critical Care and Emergency
Sept 2013	2	Converted to procedure and re-formatted by Scarlette Acevedo, District Policy Officer
Sept 2013	2	Revised by Dr Ralph Stanford, Staff Specialist/Orthopaedic Surgeon, Prince of Wales Hospital and Leanne Horvat, Clinical Stream Nurse Manager, Medicine, Critical Care & Emergency
Nov 2013	3	Clinical & Quality Council provided requested further amendments to be made. Further amendments made by Leanne Horvat, Clinical



**Acute Spinal Cord Injury of the Adult –  
Management and Referral Procedure**

**SESLHDPR/291**

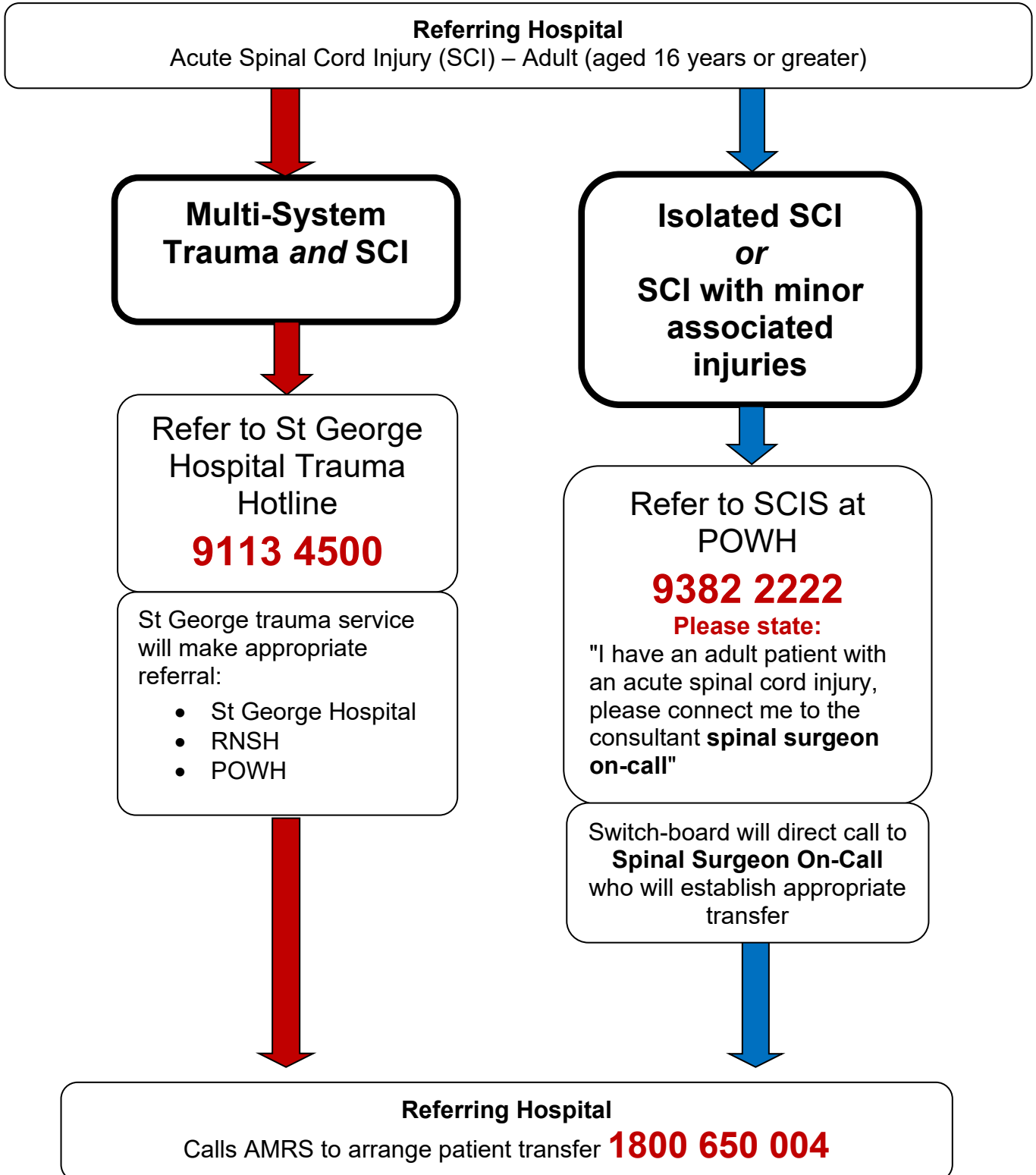
		Stream Nurse Manager, Medicine, Critical and Emergency Clinical Stream and Dr Ralph Stanford, Staff Specialist/Orthopaedic Surgeon POW.
Dec 2013	3	Finalised and re-formatted by Scarlett Acevedo, District Policy Officer.
Nov 2015	4	Revised by Liz Walter, District Trauma CNC, SESLHD
Dec 2015	4	Endorsed by: The Network Trauma Committee
January 2016	4	Endorsed by: Dr Tony Joseph, Director of Trauma, RNSH
February 2016	4	Endorsed by Executive Sponsor
June 2016	4	Approved by SESLHD CQC
November 2018	5	Review undertaken with no changes – approved by Executive Sponsor.
November 2018	5	Processed by Executive Services prior to publishing.
August 2021	6	Minor review by Jennifer Ings, District CNC Trauma & PARTY, SESLHD: formatting changes, new links and ASIA form updated to current version. Endorsed by Executive Sponsor.
September 2021	7	Reference Number 7 replaced. Approved by Executive Sponsor.
17 October 2023	7.1	Minor review including requirement to complete the Spinal Cord Injury Referral and Transfer Form to accompany the patient, added to Appendix 2.

# SESLHD PROCEDURE

## Acute Spinal Cord Injury of the Adult – Management and Referral Procedure

SESLHDPR/291

### Appendix 1







# SESLHD PROCEDURE

## Acute Spinal Cord Injury of the Adult – Management & Referral Procedure

SESLHDPR/291

### Appendix 2

#### ACUTE SPINAL CORD INJURY REFERRAL AND TRANSFER FORM (v March 2016)

This form is to be completed prior to transfer of the person with a SCI to a spinal or trauma unit and given to the Retrieval or NSW Ambulance Service teams as part of the medical record and/or faxed to the receiving hospital.

Patient label

<b>CONTACT DETAILS</b>	Patient name:		Age:	
	Referring Hospital:	Referring Doctor:	Weight (kg):	
	Referring Doctor's contact number:			
	Referral date ___/___/___      Referral time ___:___AM/PM			
	Hospital accepting referral:	Doctor accepting referral:	Destination ward:	
		Accepting Doctor's contact number:		
<b>SPINAL CORD INJURY</b>	Date of injury ___/___/___	Time of injury ___:___AM/PM		
	Mechanism of Injury:		For guidance on sensory and motor level refer to attached neurological chart.	
	Approximate sensory level:	Approximate motor level:		
	Is peri-anal sensation present: YES <input type="checkbox"/> NO <input type="checkbox"/>	Is anal contraction present? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	Results of Spinal X-Rays, CT or MRI Scan			
<b>SPINAL PRECAUTIONS &amp; STABILISATION</b>	Cervical collar <input type="checkbox"/> YES <input type="checkbox"/> NO Type of collar _____		Surgery <input type="checkbox"/> YES <input type="checkbox"/> NO      Date of surgery ___/___/___ Type of surgery _____	



# SESLHD PROCEDURE

## Acute Spinal Cord Injury of the Adult – Management & Referral Procedure

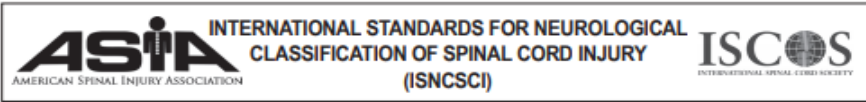
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### Appendix 2

	Time of application of collar __:__AM/PM		
<b>AIRWAY *</b>	<input type="checkbox"/> ETT in situ <input type="checkbox"/> Correct ETT position	<input type="checkbox"/> ETT secure <input type="checkbox"/> NGT/OGT if intubated or vomiting	<input type="checkbox"/> Mechanical vent.
<b>BREATHING *</b>	Resp rate _____ SpO2 _____ Vital Capacity _____ (10-15mls/kg)	FiO2 _____ lt/min ABGs - PaO2 _____ PaCO2 _____ pH _____	Chest tubes <input type="checkbox"/> YES <input type="checkbox"/> NO
<b>CIRCULATION *</b>	Pulse _____/min Blood Pressure ____/____ mmHG	Urine Output >0-5mls/kg/hr <input type="checkbox"/> YES <input type="checkbox"/> NO Arrhythmias	<input type="checkbox"/> IDC <input type="checkbox"/> SPC Core Temp ____°C
	<input type="checkbox"/> Peripheral IVs – number _____ <input type="checkbox"/> Other IV / arterial access	Fluid resuscitation _____ Total fluids in _____ Litres.	
<b>LEVEL OF CONSCIOUSNESS *</b>	Level of consciousness at scene: GCS _____    Seizures: <input type="checkbox"/> NO <input type="checkbox"/> YES _____:____AM/PM Current level of consciousness: GCS _____    _____:____AM/PM		
<b>ASSOCIATED INJURIES</b>			
<b>MEDICAL CONDITIONS</b>			
<b>SKIN PROTECTION</b>	Has the patient been log rolled and skin checked 2 <sup>nd</sup> hourly? <input type="checkbox"/> YES <input type="checkbox"/> NO Time of last log roll _____ hours    Time skin under cervical collar checked _____ hours		
<b>DOCUMENTATION FOR TRANSFER</b>	<input type="checkbox"/> AMRS / NETS Transfer form * Relevant records: <input type="checkbox"/> medical & <input type="checkbox"/> nursing	<input type="checkbox"/> X-rays/CT/MRI scans - spinal column <input type="checkbox"/> X-rays/CT/MRI scans-head/chest/abdo/pelvis/limbs	
<b>NEXT OF KIN (NOK)</b>	Notified <input type="checkbox"/> YES <input type="checkbox"/> NO    NOK Name..... Ph .....		

Acute Spinal Cord Injury of the Adult – Management & Referral Procedure

SESLHDPR/291



Patient Name \_\_\_\_\_ Date/Time of Exam \_\_\_\_\_  
 Examiner Name \_\_\_\_\_ Signature \_\_\_\_\_

RIGHT		SENSORY KEY SENSORY POINTS		SENSORY KEY SENSORY POINTS		LEFT		
MOTOR KEY MUSCLES		Light Touch (LTR)	Pin Prick (PPR)	Light Touch (LTL)	Pin Prick (PPL)	MOTOR KEY MUSCLES		
		C2				C2		
		C3				C3		
		C4				C4		
<b>UER</b> (Upper Extremity Right)	Elbow flexors	C5				C5	Elbow flexors	
	Wrist extensors	C6				C6	Wrist extensors	
	Elbow extensors	C7				C7	Elbow extensors	
	Finger flexors	C8				C8	Finger flexors	
	Finger abductors (little finger)	T1				T1	Finger abductors (little finger)	
<b>Comments</b> (Non-key Muscle? Reason for NT? Pain? Non-SCI condition?):		T2				T2		
		T3				T3		
		T4					T4	
		T5					T5	
		T6					T6	
		T7					T7	
		T8					T8	
		T9					T9	
		T10					T10	
		T11					T11	
		T12					T12	
				L1				L1
<b>LER</b> (Lower Extremity Right)	Hip flexors	L2				L2	Hip flexors	
	Knee extensors	L3				L3	Knee extensors	
	Ankle dorsiflexors	L4				L4	Ankle dorsiflexors	
	Long toe extensors	L5				L5	Long toe extensors	
	Ankle plantar flexors	S1				S1	Ankle plantar flexors	
		S2				S2		
		S3				S3		
		S4-5				S4-5		
<b>(VAC) Voluntary Anal Contraction</b> (Yes/No) <input type="checkbox"/>							<b>(DAP) Deep Anal Pressure</b> (Yes/No) <input type="checkbox"/>	
<b>RIGHT TOTALS (MAXIMUM)</b>		(50)	(56)	(56)	(56)	<b>LEFT TOTALS (MAXIMUM)</b>		
<b>MOTOR SUBSCORES</b>		<b>SENSORY SUBSCORES</b>						
UER <input type="checkbox"/> + UEL <input type="checkbox"/> = UEMS TOTAL <input type="checkbox"/>	LER <input type="checkbox"/> + LEL <input type="checkbox"/> = LEMS TOTAL <input type="checkbox"/>	LTR <input type="checkbox"/> + LTL <input type="checkbox"/> = LT TOTAL <input type="checkbox"/>	PPR <input type="checkbox"/> + PPL <input type="checkbox"/> = PP TOTAL <input type="checkbox"/>					
MAX (25)	MAX (25)	MAX (56)	MAX (56)					

**NEUROLOGICAL LEVELS** Steps 1-6 for classification as on reverse

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)  
 Incomplete = Any sensory or motor function in S4-5

5. ASIA IMPAIRMENT SCALE (AIS)

6. ZONE OF PARTIAL SENSORY PRESERVATION: R  L   
 Most caudal levels with any innervation

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

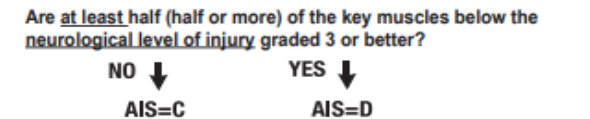
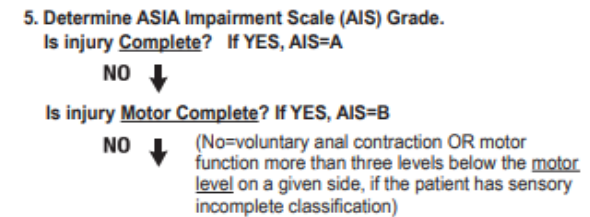
**E = Normal.** If sensation and motor function as tested with the ISNCSCI are graded as normal in all segments, and the patient had prior deficits, then the AIS grade is E. Someone without an initial SCI does not receive an AIS grade.

**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.



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".

