Spinal Cord Injury Care Pathway

(In collaboration with Duke of Cornwall Spinal Treatment Centre, Salisbury District Hospital)

Patient name:……..…. DOB:……Hospital Number:…… Address:…… …… (or Addressograph)	**Consultant Neurosurgeon/ Orthopaedic Surgeon/ Other responsible for SCI care:** …… *(Please complete the individual speciality clerking proforma for clinical details and attached this document on diagnosis of spinal cord injury, either traumatic or non-traumatic)*

Admission details:

Date and time of Injury: ……

Mechanism of Injury**:** : Traumatic SCI: ☐ / Non-traumatic SCI : ☐

Date:	**Provisional/ Actual Spinal Injury Diagnosis**

Spinal Injury Neurological Assessment Record :*complete ASIA Score using attached charts*

1st	Within 4hrs of admission by assessing Dr.	ASIA completed YES ☐ No ☐	Date completed	sign
2nd	Within 24hrs of admission	ASIA completed YES ☐ No ☐	Date completed	sign
3rd	Within 72hrs of admission	ASIA completed YES ☐ No ☐	Date completed	sign
4th	Further neurological changes	ASIA completed YES ☐ No ☐	Date completed	sign
5th	Further neurological changes	ASIA completed YES ☐ No ☐	Date completed	sign

(ASIA Score to be completed once diagnosis within 24 hours, 72 hours and following any clinical changes.If spinal surgery is undertaken the ASIA Chart must be carefully completed both pre and post-operatively. NB: this is however less reliable in the presence of spinal shock)

Current Management of Injury: *spine precautions/ orthotics/patient handling*		
Date	Logroll Y☐N☐Sit up Y☐N☐Full mobilisation Y☐N☐TLSO Y☐N☐ JTO Y☐N☐ Traction Y☐N☐ Halo Y☐N☐Hard collar Y☐N☐ orthotic referral Y☐N	SPR/Dr SIGN
Date	Logroll Y☐N☐Sit up Y☐N☐Full mobilisation Y☐N☐TLSO Y☐N☐ JTO Y☐N☐ Traction Y☐N☐ Halo Y☐N☐Hard collar Y☐N☐ orthotic referral Y☐N☐	SPR/Dr SIGN
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SPINAL CORD INJURY PATHWAY ALGORITHM

Inclusion Criteria

Clinical diagnosis of spinal cord injury resulting in full or partial, para or tetraplegia as a result of -traumatic & non traumatic insult (tumour, complete and incomplete cauda equina, abscess and infection, haematoma).

Admission to NBT

Traumatic | **Non Traumatic**

Assessment & provisional SCI Diagnosis

Neurological assessment, triage/m*anagement of associated injuries, respiratory evaluation and neuro-protection therapy*

Exclusion Criteria

Injury to the vertebral spine without cord injury.

Useful contact numbers

-Neurosurgical Spinal ANP- bleep 1192 /1153
-Orthopaedic Spinal NP- 07798581139
-Trauma network team NP-bleep 1630/1623
-Neuro Physio lead- bleep 1394

Initiate Spine Cord Injury Pathway

Complete this document as well asyour individual specialty proforma/documentation.

Contact SCI Centre
Tel: 01722 336262
Traumatic callby 4 hours Non-Traumaticcall made on diagnosis

Verbal Doctor to Doctor referral process please ensure additional required assessments completed, including anaesthetic. Immediate medical needs prioritised and .confirmation ofisolated SCI level and sensory with significant associated injuries. Appropriate location for optimum medical management agreed (including surgery). Immediately agreed management plan for SCI documented in SCI pathway.

Online registration of SCI Centre referral to be made (following call) this can be actioned by either Dr. or ANP. nww.scireferrals.nhs.uk *.Print off confirmation email and sign SCI pathway.*

NB: ASIA Score within 24 hours and again at 72 hours- forms attached to SCI pathway – helpful to do this prior to call if possible.

Follow SCIC management, admission and outreach adviceplan

Traumatic SCI Transfers

Transfers to SCIC or local hospital repatriation to be organised by trauma team as per the trauma pathway guidelines

Patient Review by a member of SCIC outreach team within 5 days if appropriate

Patient appropriate for SCI Centre admission Referral prioritised & bed availability notified– weekly email updates to be sent to relevant NBT team members, Staff to contact SCIC outreach team for all ongoing care management queries. .

Non- Traumatic SCI Transfers

Transfer to SCIC or local hospital repatriation to be organised by discharge liaison team for speciality as per local guidelines.

Patient medically fit for transfer*(use transfer protocol on page 7)*

Transfer to SCIC – transport to be booked by 10am so that admission is on or by 1pm. Transfer to local trauma units

Section 1. Referral to Spinal Cord Injury Centre (SCIC): *(both a&b are mandatory)*

☐Duke of Cornwall Spinal Treatment Centre, Salisbury District Hospital, Salisbury (01722 336262)

☐Other……..

a) Verbal referral and management plan discussed with Consultant/SPR at SCIC

☐***within 4 hrs of injury/ diagnosis*** withCons/SPR……..……

Call made by Dr…….…… Date……Time ……..…Signature…….

☐***within 24 hrs of injury/ diagnosis*** with Cons/SPR……..……

Call made by Dr…… Date……Time ……..…Signature……..

b) Online referral form (after call): By.....……..Date……Signature…….

Please record plan from SCIC- *complete eachsection ask to prompt if needed*		**Deviation from plan**
Ventilation		Y☐N☐
Circulation	MAP target…..……....., duration…….	Y☐N☐
Position		Y☐N☐
DVT		Y☐N☐
SKIN		Y☐N☐
Gastric protection	☐ NBM/ ☐ NG Free drainage/ ☐ NG feed	Y☐N☐
Bladder	☐ Indwelling catheter/ ☐ Suprapubic catheter ☐ Self-Intermittent catheterisation	Y☐N☐
Bowel	Commence NBT neurogenic bowel pathway: ☐Reflexic pathway / ☐Areflexic pathway	Y☐N☐
Autonomic dysreflexia	At risk of AD? Y☐ (if SCI at or above T6) / N ☐	Y☐N☐
Mental health	Mental health referral advised? Yes ☐ / No ☐	Y☐N☐

Document deviation and reasoning if any :

……

……

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……

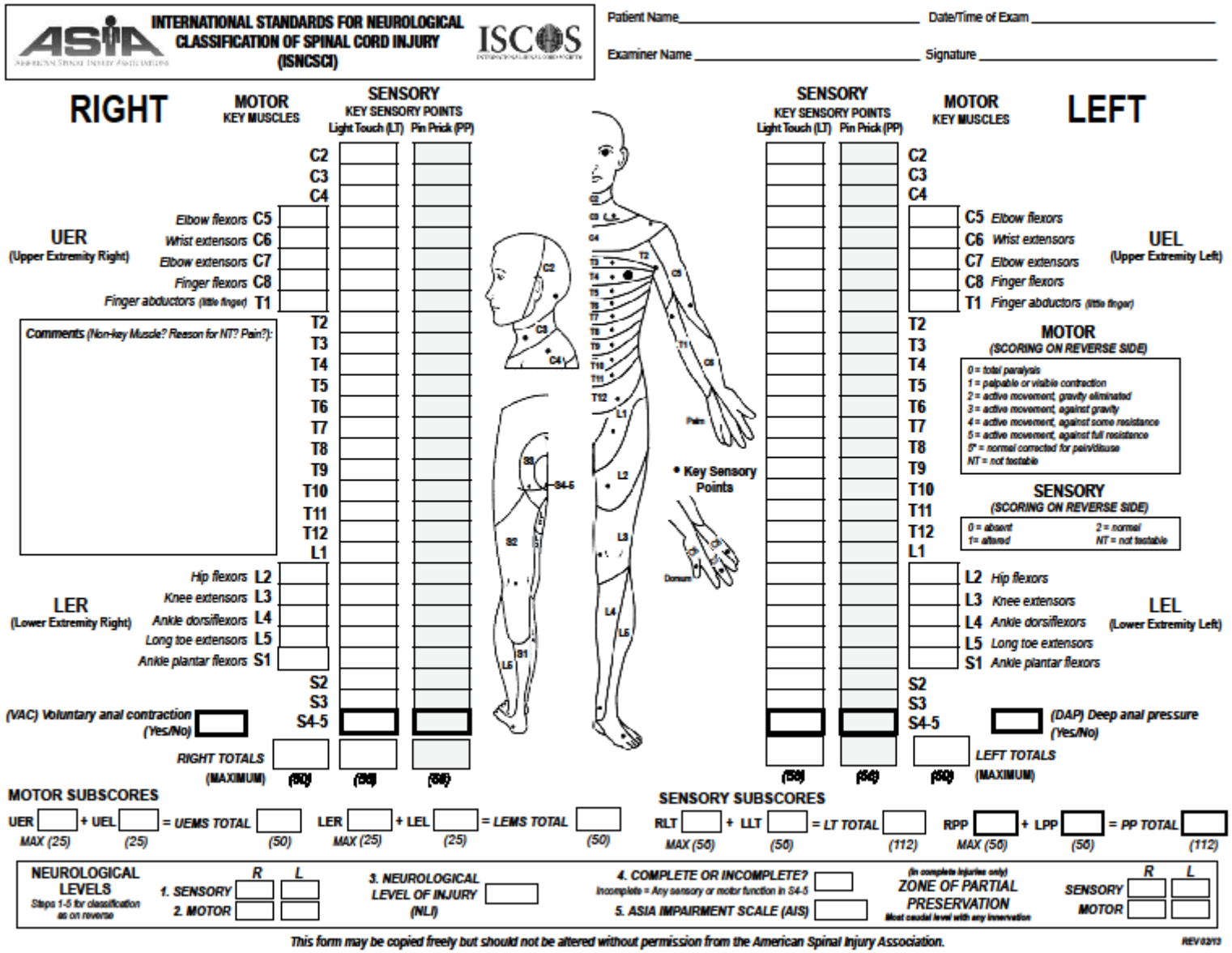
……

Section 2. SCIC Outreach visits – visits by specialist spine practitioners		
Date	Advice given	Sign

Guidance for SCI prescription

Regular	Rationale
Anticoagulants within 24 hrs unless contraindicated - Enoxaparin, TEDS, Flowtrons	Prevention of DVT/ PE
IV fluids	Maintain a systolic BP of 90-100mmHg- **discussion on referral**
Aperients- according to neurogenic bowel protocol. Daily PR check plus manual evacuation.*When bowel sounds return, passage of flatus occurs or bowels move consistently then aperients may be started*	
-Reflexic bowel only- 2 Glycerine suppositories daily followed by digital stimulation/manual evacuation -Areflexic bowel- daily manual evacuation *Docusate 100-200 mg b.d* *Movicol 1 sachet b.d.* *Lactulose could also be considered*	*15-30 mins prior to rectal examination and evacuation if the rectum is full.* *Empty rectum prior to insertion of suppositories. Wait 20-30 minutes then proceed to d.s/m.e until bowel is empty. Observe for signs of autonomic Dysreflexia in patients with T6 and above injuries.*
As required	**Rationale**
Up to 4 litres normal saline (+/- K^+) IV	to maintain urine output 0.5 mls/kg/ hr
Atropine 0.3-0.6mg may be given as IV bolus if the patient is cardio-vascularly unwell or unstable	Extreme bradycardia can result in cardiac syncope. If heart rate drops below, and remains below, 40 beats per minute
PPI: (Omeprazole 20mg OD /Lansoprazole 30 mg OD. Ranitidine 150mg if PPI contraindicated)	Stress ulceration
Sublingual Nifedipine 10 mg bitten or GTN sublingual	Autonomic dysreflexia
Ephedrine 30-60mg (once /day) prior to trial of patient sitting out for the first time	To prevent postural drop-To be used with therapy only

Transfer to SCIC Checklist	**Yes**	**No**	**NA**
Does this patient need a HDU or ITU bed?			
Immobilisation of the spine is adequate and secure Long bone fracture immobilisation			
Airway is clear and can be maintained during transfer (intubate if PaCO2 is >*5.5* KPa or if respiratory failure is likely to develop during a prolongedtransfer)			
Supplemental O2 is being administered and ventilation is adequatewhether spontaneous or assisted. Voluntary vital capacity should exceed > 15 ml/kg: elective ventilation ifincipient or frank respiratory failure			
Chest drainage if pneumothorax or haemothorax before transfer			
IV is patent and infusing at desired rate			
Naso-gastric tube is in situ, draining freely.			
Indwelling urinary catheter is in situ and draining freely			
Skin is protected from injury and apparatus or debris which may causepressure ulcers is cleared away			
Level of Spinal Cord Injury is documented			
Other injuries – thorax, abdomen, pelvis etc. are documented and stabilised			
Any head injury documented and monitored			
Copy of Medical records, drug charts and test results			
X-rays or radiology images have been transferred using Image Exchange Portal ☐ or decryptedCD☐			
Nurse to Nurse handover			
Family/ relatives aware of transfer			
Repatriation to another Hospital:			
Copy of Medical records, drug charts and test resultsincluding SCI care documents.			
Nurse to Nurse handover			
Transfer letter			
Outpatients Appointment? Date_____ Time_____			
Planning for home			
TTA completed and dispensed			
Family aware of discharge			
Transport Booked			
Package of Care set up			


INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCSCI)
ISCOS
Patient Name
Date/Time of Exam
Examiner Name
Signature
RIGHT
MOTOR KEY MUSCLES
SENSORY KEY SENSORY POINTS Light Touch (LT) Pin Prick (PP)
LEFT
UER (Upper Extremity Right)
Elbow flexors C5
Wrist extensors C6
Elbow extensors C7
Finger flexors C8
Finger abductors (little finger) T1
UEL (Upper Extremity Left)
C5 Elbow flexors
C6 Wrist extensors
C7 Elbow extensors
C8 Finger flexors
T1 Finger abductors (little finger)
Comments (Non-key Muscle? Reason for NT? Pain?):
C2 C3 C4 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 L1
MOTOR (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
5* = normal corrected for pain/disuse
NT = not testable
SENSORY (SCORING ON REVERSE SIDE)
0 = absent
1 = altered
2 = normal
NT = not testable
LER (Lower Extremity Right)
Hip flexors L2
Knee extensors L3
Ankle dorsiflexors L4
Long toe extensors L5
Ankle plantar flexors S1
LEL (Lower Extremity Left)
L2 Hip flexors
L3 Knee extensors
L4 Ankle dorsiflexors
L5 Long toe extensors
S1 Ankle plantar flexors
S2 S3 S4-5
• Key Sensory Points
(VAC) Voluntary anal contraction (Yes/No)
(DAP) Deep anal pressure (Yes/No)
RIGHT TOTALS
LEFT TOTALS
(MAXIMUM)
MOTOR SUBSCORES
UER + UEL = UEMS TOTAL
MAX (25) (25) (50)
LER + LEL = LEMS TOTAL
MAX (25) (25) (50)
SENSORY SUBSCORES
RLT + LLT = LT TOTAL
MAX (56) (56) (112)
RPP + LPP = PP TOTAL
MAX (56) (56) (112)
NEUROLOGICAL LEVELS
Steps 1-5 for classification as on reverse
1. SENSORY
2. MOTOR
R L
3. NEUROLOGICAL LEVEL OF INJURY (NLI)
4. COMPLETE OR INCOMPLETE?
Incomplete = Any sensory or motor function in S4-5
5. ASIA IMPAIRMENT SCALE (AIS)
(In complete injuries only)
ZONE OF PARTIAL PRESERVATION
Most caudal level with any innervation
SENSORY
MOTOR
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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

5* = (normal) active movement, full ROM against gravity and sufficient resistance to be considered normal if identified inhibiting factors (i.e. pain, disuse) were not present

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 range of motion)

Sensory Grading

0 = Absent

1 = Altered, either decreased/impaired sensation or hypersensitivity

2 = Normal

NT = Not testable

Non Key Muscle Functions (optional)

May be used to assign a motor level to differentiate AIS B vs. C

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

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 below the neurological level**, and more than half of key muscle functions below the neurological level of injury (NLI) have a muscle grade less than 3 (Grades 0-2)

D = Motor Incomplete Motor function is preserved below the neurological level**, and at least half (half or more) of key muscle functions below the NLI have 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

** For an individual to receive a grade of C or D, i.e. motor incomplete status, they must have either (1) voluntary anal sphincter contraction or (2) sacral sensory sparing with sparing of motor tunction more than three levels below the motor level for that side of the body. The International Standards at this time allows even non-key muscle function more than 3 levels below the motor level to be used in determining motor incomplete status (AIS B versus C)

NOTE: When assessing the extent of motor sparing below the level for distinguishing between AIS B and C, the ***motor level*** on each side is used; whereas to differentiate between AIS C and D (based on proportion of key muscle functions with strength grade 3 or greater) the ***neurological level of injury*** is used

ASIA
AMERICAN SPINAL INJURY ASSOCIATION

INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY

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** and can record ZPP (lowest dermatome or myotome on each side with some preservation)

NO ↓

Is injury Motor Complete? **If YES, AIS=B**

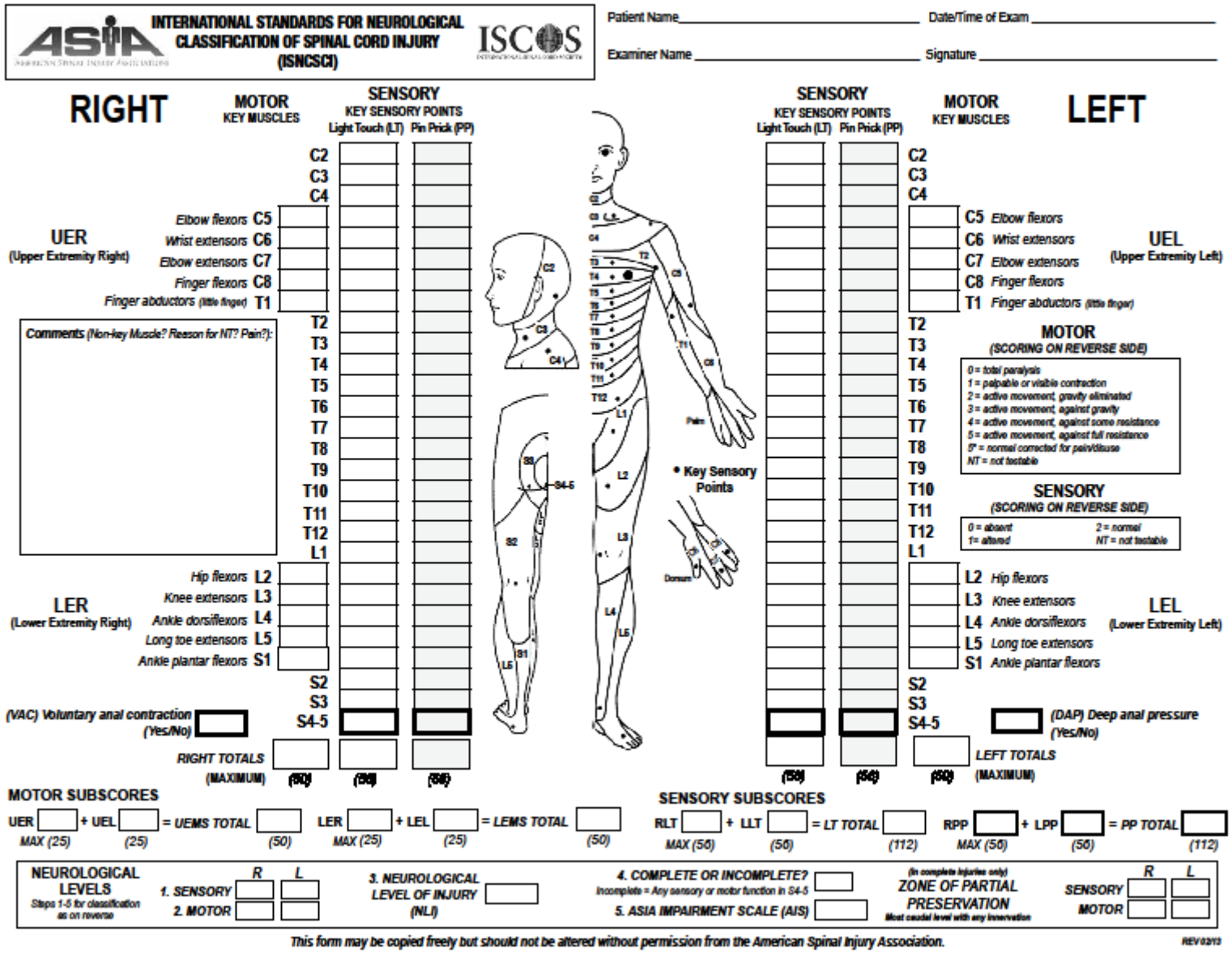
NO ↓ (No=voluntary anal contraction OR motor function more than three levels below the motor level on a given side, if the patient has sensory incomplete classification)

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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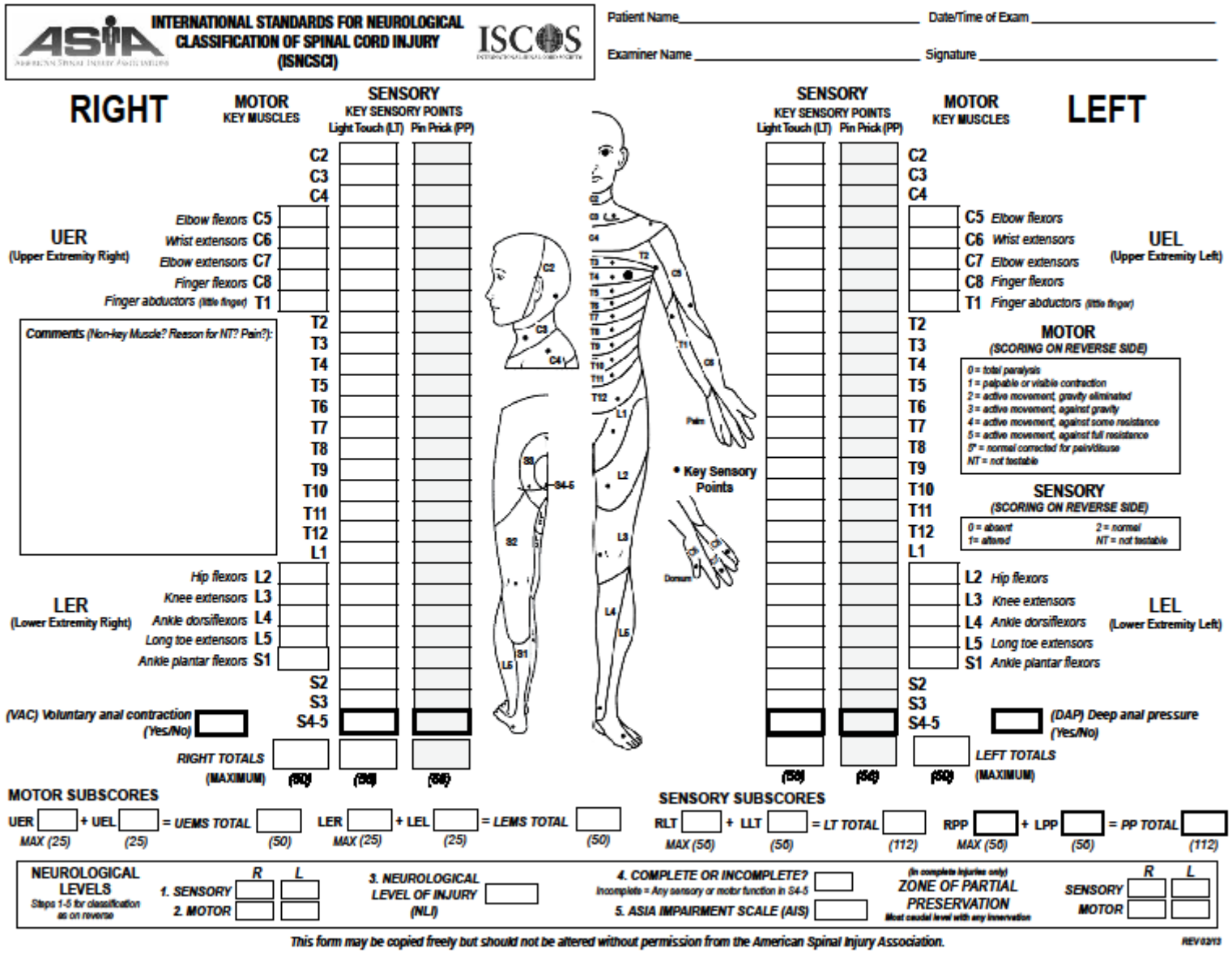
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Communication Sheet	Date & sign