

Rehabilitation in Conflict

SPINAL CORD INJURY



What we will cover:

- Management in Humanitarian Settings
- Common Complications
- Adapted Clinical practice

Quick overview

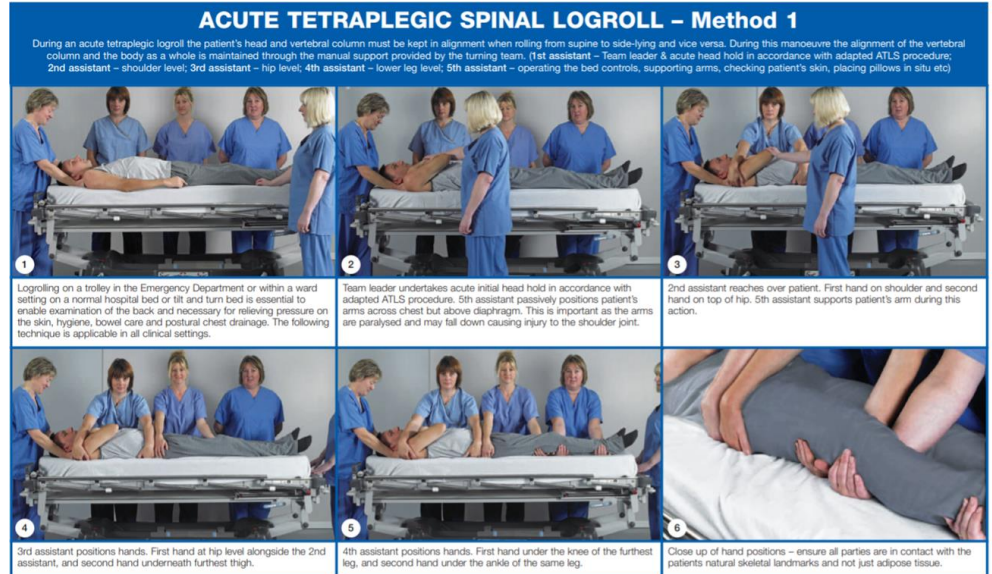
- Commonly Lower > Higher level injuries
- Complete and incomplete injuries – highly dependent on environment and circumstances
- Polytrauma not just SCI

Management in Humanitarian Settings

- Access to CT, spinal surgery etc can be an issue > conservative management more likely
- Conservative management may = 3 months bed rest with full spinal precautions
- Respiratory Management as available - limited access to ventilators for respiratory support if they deteriorate
- CVS assessment and care (including anti-coagulation therapy)
- Neurological Assessment (ASIA)
- Bladder/Bowel Care
- Pressure Care, with 2 hour turning under full spinal precautions

Handling precautions may stay in place for suspected unstable fractures

- 5 person roll T4 and above
- 4 person roll T5 and below



- See <https://www.mascip.co.uk/wp-content/uploads/2015/02/MASCIP-SIA-Guidelines-for-MH-Trainers.pdf>

Spinal Stability

- Date of injury
- Bony level of injury (Xray if no CT or MRI)
- Neurological level of injury
- Stable/Unstable

<http://www.mascip.co.uk/wp-content/uploads/2015/02/MASCIP-SIA-Guidelines-for-MH-Trainers.pdf>

Neurological Assessment

- INSCI/ASIA Assessment: A universal classification tool for spinal cord injuries based on a standardized sensory and motor assessment.
- It involves both a Motor and Sensory examination to determine the Sensory Level and Motor Level for each side of the body (Right and Left), the single Neurological Level of Injury (NLI) and whether the injury is Complete or Incomplete.

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

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; the ASIA Impairment Scale does not apply.

Grade	Type of Injury	Description of Injury
A	Complete	No Sensory or Motor Function is preserved in the Sacral Segments S4-S5
B	Sensory Incomplete	Sensory but not Motor Function is preserved below the neurological level and includes the Sacral Segments S4-S5, 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 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.

Common Complications for the therapist to be aware of

- Neurogenic Shock
- Pressure injury
- Respiratory Compromise
- Autonomic Dysreflexia
- (also pain, bladder/bowel, oedema, Contracture)






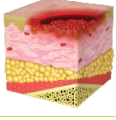

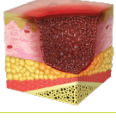






Neurogenic Shock

- This a sudden disruption of signals that maintain autonomic nervous system control
- Normally within 24 hour post injury
- Sudden vasodilation leading to hypotension, this occurs after an acute spinal cord injury (typically above T6) that blocks sympathetic activity.
- Neurogenic shock should be suspected if there is a cervical or high thoracic injury with no signs of fluid loss.
- Can be fatal if not addressed – managed with IV fluids, vasopressors and Atropine if HR is low.
- **SLIGHTLY ALTER EXPLANATION SEE NOTES**

Pressure Injury

- Do not sit out on any skin lesion, even grade 1
- Offload any area of non blanching erythema until resolved
- **Regular skin checks on every turn**
- Turning 2 hourly
- Ensure adequate nutrition and hydration
- Once PU has occurred risk of higher risk of reoccurrence

Pressure Ulcer Categorisation Guide

How to Categorise ¹			
Category I		Intact skin with localised non-blanchable erythema, usually over a bony prominence. Skin discolouration, warmth, oedema, hardness or pain may be present and may differ compared to adjacent tissue. May indicate 'at risk' persons.	
Category II		Partial thickness loss of dermis presenting as a shiny or dry, shallow open ulcer with a red/pink wound bed with minimal slough or bruising. Can also include intact or ruptured blisters. Does not include skin tears, tape burns, incontinence associated dermatitis, maceration or excoriation.	
Category III		Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed or directly palpable. Some slough may be present. May include undermining and tunnelling. Depth varies by location and can be shallow in areas without subcutaneous tissue eg. on the ear, or extremely deep in areas of significant adiposity.	
Category IV		Full thickness tissue loss with visibly exposed or directly palpable bone, tendon or muscle. Often includes undermining and tunnelling. Depth varies by location and can be shallow in areas without subcutaneous tissue eg. on the ear. Can extend into muscle and/or supporting structures (eg. fascia, tendon or joint capsule) making osteomyelitis likely to occur.	
Unstageable/Unclassified		Full thickness tissue loss where actual ulcer depth is obscured by slough (yellow, tan, grey, green or brown) and/or eschar (tan, brown or black). True depth cannot be determined until enough slough and/or eschar is removed, but will be either a Category III or IV. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heel should not be removed until a Doppler assessment has been completed.	
Suspected Deep Tissue Injury (SDTI)		Purple or maroon localized area of discoloured intact skin or blood-filled blister due to pressure/shear damage of underlying soft tissue. May be preceded by painful, firm, boggy, warmer or cooler skin as compared to adjacent tissue. Evolution may be rapid, exposing additional tissue layers even with treatment.	

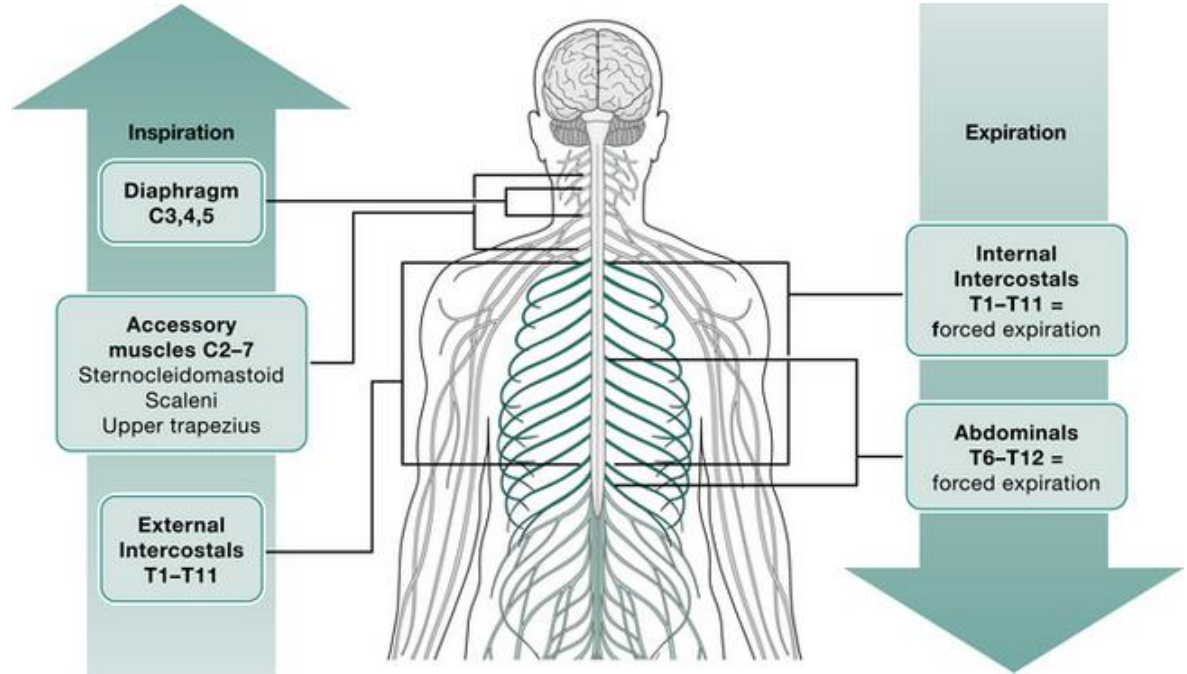
Based on International NPUAP-EPUAP-PPPIA Pressure Ulcer Classification System.¹

NB: Injuries may be more difficult to detect in more darkly pigmented skin, and may not have visible blanching; its colour may differ from the surrounding area.

Reference: 1. NPUAP-EPUAP and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Quick Reference Guide. Emily Haackler (Ed.). Cambridge Media: Osborne Park, Western Australia; 2014.

Respiratory Complications

- All complete injuries C5 and above need ventilation
- Above T12 = “restrictive respiratory disorder”



Autonomic Dysreflexia (AD)

- It is an exaggerated response of the sympathetic nervous system to a continual painful or noxious stimulus.
- Normally > 1 month post injury but can be earlier
- Typically in injuries T6 or higher.

NB: It is a Medical Emergency and can lead to a Myocardial Infarction (M.I.) or stroke leading to death, if left untreated

Autonomic Dysreflexia

Signs and Symptoms

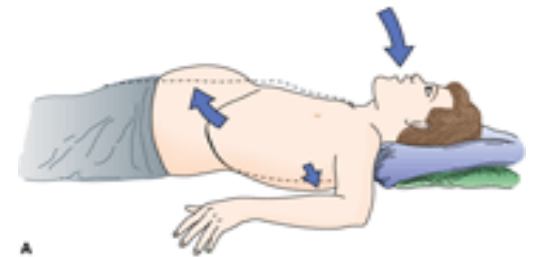
- Pounding headache
- Flushing and/or sweating above level of injury
- Significant raise in BP from normal
- Drop in HR (end stages)
- Cardiac arrest/CVE
- Death

Management

- Identify painful stimulus causing the symptoms
- Remove painful stimulus (eg/ change catheter, evacuate bowels)
- Sit patient UP to use postural hypotension to reduce BP
- Administer nifedipine 10mg sublingual

Why SCI is different.....

- Neuromuscular injury - level and completeness of injury is different for every patient.
- WOB less in supine, T6 and above.
- Record FVC – TV 10mls/kg. If FVC < 1litre vent support likely to be required.
- Hypersecretion increases if injury above T6
- Ineffective or absent cough T6 and above.
- Above T12 = cough impairment



Pain

Pain type	Subtype	Examples
Nociceptive pain		
Musculoskeletal	Musculoskeletal pain	Shoulder arthritis
Visceral	Visceral pain	Abdominal pain due to impaction
Other	Other nociceptive pain	Postoperative pain
Neuropathic pain		
At-level SCI	At-level SCI pain	Nerve root injury, spinal cord compression
Below-level SCI	Below-level SCI pain	Spinal cord compression, thalamic deafferentation pain
Other	Other neuropathic pain	Carpal tunnel syndrome, polyneuropathy
Other pain syndromes		Fibromyalgia, complex regional pain syndrome (CRPS), etc.

Adapted Clinical Practice

- Cohort patients if possible
- Be able to spot or prevent complications
- Normal rehabilitation principles apply but adapt for unstable spine/conservative management.
- Adapted resp care for unstable spines

For more on SCI care see

- www.asia-spinalinjury.org
- www.mascip.co.uk
- www.elearnsoci.org

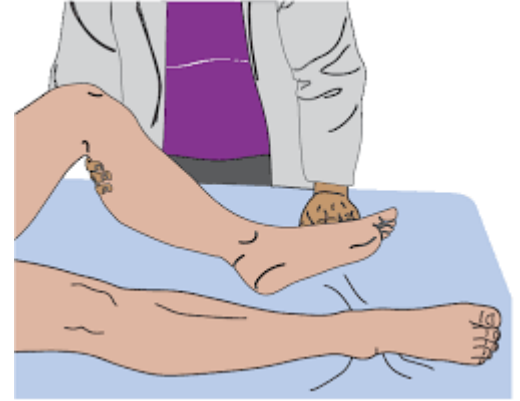
Therapy precautions for unstable spine

T4 and above



- Shoulder hold for all UL movements above 90 degrees
- Shoulder hold for assisted cough
- Bilateral manual chest techniques in supine
- Shoulder hold for all LL movements

T9 and below



- No hip flexion beyond 30 degrees
- Ext rotate hip to move hip into flexion beyond 30 degrees
- Do not cross legs over midline

Respiratory precautions for unstable spine

- Aim: Reduce work of breathing, maintain lung compliance, aid secretion clearance.
- Abdominal binder for tetraplegic patients
- Treat in supine
- Bilateral chest techniques **with** shoulder hold >T4
- Manual assisted cough BILATERAL and **with_**shoulder hold >T4
- **No MAC** if have paralytic ileus- shaking

Manual Assisted Cough



Oedema Management

- 24 hour programme
- Elevation
- Positioning
- Retrograde massage
- Passive and active assisted range of movement



Joint Range of Movements

- Maintain joint range of movement
- Maintain soft tissue length
- Prevent deformity
- Assist circulation
- Reduce oedema



Passive Movements

Precautions:

- Spinal stability
- Extreme ROM
- Neural tension
- Tenodesis



Active/Facilitated Exercises

Considerations:

- Spinal stability
- ASIA classification
- Muscle imbalance
- Core stability
- Posture
- Joint alignment (mid range)
- Compensatory movement patterns
- Theraband/PNF/FES?



Splints and Orthoses

- “keep me’s”



- Wrist supports



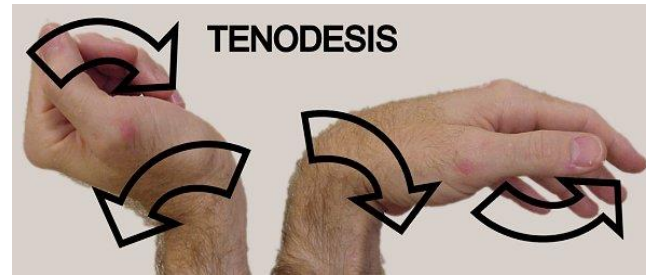
- Hand based splints with wrist supports



Splint Wearing Regime

- Build up tolerance gradually
- Educate patient and staff on donning and doffing
- Monitor skin
- Written guidelines with pictures
- Review changing needs
- Patient feedback
- Patient concordance

Tenodesis



- Only use with complete injuries where no recovery is expected
- Do not stretch the wrist into extension with extended fingers.
- Careful consideration and informed consent is essential
- Used to purposefully shorten finger flexors and thumb adductors to strengthen a tenodesis grip and/or improve position
- Careful monitoring and tenodesis ranging required to prevent fixed joint contractures

Adapted Clinical Practice Continued

- 2 hourly turns with spinal precautions is ++ resource intensive - teach caregivers to assist with safe handling
- Work with nursing staff regarding pressure care and pressure wound management
- Start discharge planning from admission
- MHPSS support is vital
- Use peer support where available

Thank you!
Any questions?