AAVBC

American Academy
of Value Based Care

Chronic Spinal Cord Disorders

Quick Reference Guide

2026

AAVBC Chronic Spinal Cord Disorders - Quick Reference Guide

Table of Contents

1. CLINICAL SNAPSHOT

Definition: Chronic spinal cord injury refers to a permanent and/or progressive interruption in the conduction of impulses across the neurons and tracts of the spinal cord. It may be due to a traumatic or a nontraumatic cause, such as mechanical distortion or vascular ischemia of the spinal cord arising from trauma, tumor, infection, or other space-occupying lesions. The term is generally used when elements of spinal cord injury have been present for at least 1 year. The accompanying neurologic deficits that occur may be stable or progressive and lead to disability with associated spasticity, joint contractures, sensory changes, and sphincter and locomotion abnormalities.[1]

ICD-10 Codes: Use G95.x for diseases of the spinal cord. **G95.0** (Syringomyelia and syringobulbia), **G95.1** (Vascular myelopathies)**, G95.2** (Cord compression (nontraumatic)), **G95.8** (Other specified diseases of spinal cord), and **G95.9** (Disease of spinal cord, unspecified) map to **HCC 182 with RAF 0.478**.[2]

HCC/RAF V28: G95.0, G95.11, G95.81, G95.89 and G95.9 map to HCC 182 with RAF 0.478.

Prevalence: Approximately 308,000 Americans are currently living with a chronic spinal cord injury. The annual cost per member per year (PMPY) is highly dependent on the Neurological Level of Injury (NLI) and the ASIA Impairment Scale (AIS) grade. For 2024–2025, subsequent annual costs ranged from approximately $55,000 to over $240,000.[3]

2. RECOGNITION AND DIAGNOSIS

Medicare Screening/Diagnostic Workup

Key Diagnostic Features

Key Diagnostic Factors	Other Diagnostic Factors	Risk Factors
• **Motor weakness/paralysis** • **Loss of sensation** (light touch, pain, temperature, vibration) • Loss of fine motor coordination • Spasticity • Paresthesia, numbness, dysesthesia • **Loss of bladder control** (Urinary incontinence) • **Loss of bowel control** (Fecal incontinence) • **Erectile dysfunction**	• Central (midline) pain • Girdle pain • Musculoskeletal or visceral pain • Unsteady gait • **Changes in reflexes** (Hyper- or Hypo-reflexia) • **Back pain** • Diminished sweating below the damaged area • Increased sweating above the damaged area	• Spinal cord trauma or ischemia • Higher-level spinal cord lesion • Extremes of age • Narrow spinal canal

**Bolded text for potential symptoms of cauda equina syndrome

Key Diagnostic Tools[1,4–6]

Category	Test to Consider
Primary Imaging	MRI Spine
	CT Scan
	X-ray
Electrophysiology	EMG (Electromyography) and Nerve Conduction Study
Bladder/Urology	Urodynamic Studies
	Bladder Ultrasound
Specialized Imaging	Myelography
	CT Angiography (CTA) or MR Angiography (MRA)
Lab/Fluid Analysis	Spinal Tap (Lumbar Puncture) / CSF Analysis
	Blood Tests

Abbreviations: CSF, Cerebrospinal Fluid; CT, Computed Tomography; CTA, Computed Tomography Angiography; EMG, Electromyography; MRA, Magnetic Resonance Angiography; MRI, Magnetic Resonance Imaging; NCS, Nerve Conduction Study

2026 Procedural Terminology (CPT) Codes for Diagnostic Tools[1,4–6]

Procedure Category	Specific Procedure	CPT Code	Clinical Application	Coverage (Medicare/MA)
Magnetic Resonance Imaging	MRI Cervical Spine (no contrast)	72141	Primary evaluation for cervical myelopathy, stenosis, chronic cord compression	**Covered when medically necessary** (objective neuro deficits, progressive symptoms, concerning exam)
	MRI Thoracic Spine (no contrast)	72146	Evaluation of thoracic cord compression or band-like thoracic symptoms	**Covered when medically necessary**
	MRI Lumbar Spine (no contrast)	72148	Evaluation of conus/cauda equina involvement and lower motor pathway symptoms	**Covered when medically necessary**
	MRI Cervical Spine (with and without contrast)	72156	Tumor, infection, inflammatory disease, demyelination	**Covered when medically necessary** (contrast requires indication)
	MRI Thoracic Spine (with and	72157	Thoracic cord lesions, malignancy, inflammatory	**Covered when medically necessary** (contrast requires

Procedure Category	Specific Procedure	CPT Code	Clinical Application	Coverage (Medicare/MA)
	without contrast)		disease	indication)
	MRI Lumbar Spine (with and without contrast)	72158	Conus/cauda equina pathology, suspected mass/inflammation	**Covered when medically necessary** (contrast requires indication)
	MR Angiography (MRA) Spine	72159	Spinal vascular anatomy, suspected AVM/vascular compromise	**Conditionally covered** (vascular indication + specialist rationale commonly expected)
Radiography and CT	X-ray Cervical Spine (2–3 views)	72040	Initial screening for alignment, degenerative change, instability	**Covered** (often initial imaging when indicated)
	CT Cervical Spine (no contrast)	72125	Bony detail or when MRI contraindicated	**Covered when indicated** (MRI contraindication, trauma/bony concern, nondiagnostic MRI)
	CT Thoracic Spine (no contrast)	72128	Thoracic bony pathology/trauma; MRI alternative when contraindicated	**Covered when indicated**
	CT Lumbar Spine (no contrast)	72131	Lumbar bony compression/instability; MRI alternative	**Covered when indicated**
	Myelography – Cervical (Radiologic S&I)	72240	CT myelography when MRI contraindicated or nondiagnostic	**Conditionally covered** (typically when MRI cannot answer the question)
	Myelography – Thoracic (Radiologic S&I)	72255	Intrathecal contrast evaluation for thoracic canal compromise	**Conditionally covered** (same rationale as above)
	Myelography – Lumbosacral (Radiologic S&I)	72265	Intrathecal contrast evaluation for lumbosacral root/canal compromise	**Conditionally covered** (same rationale as above)
	CT Angiography (CTA) Pelvis – Vascular	72191	Pelvic vascular evaluation when relevant to ischemic etiologies	**Conditionally covered** (vascular indication required; pelvic focus)
Neuro-physiology	Needle EMG (each extremity, with NCS)	95886	Distinguish radiculopathy/peripheral neuropathy from central	**Covered when medically necessary** (diagnostic uncertainty, objective

Procedure Category	Specific Procedure	CPT Code	Clinical Application	Coverage (Medicare/MA)
			processes	deficits)
	Nerve Conduction Study (1–2 studies)	95907	Limited screening to assess peripheral neuropathy	**Covered when medically necessary**
	Nerve Conduction Study (7–8 studies)	95910	Comprehensive evaluation for complex motor/sensory deficits	**Covered when complexity is supported** (distribution, severity, unclear localization)
Functional & Invasive Testing	Lumbar Puncture (Diagnostic)	62270	CSF evaluation for inflammatory/infectious/demyelinating disease	**Covered when medically necessary** (appropriate differential + exam findings)
	Urodynamics – Cystometrogram	51726	Neurogenic bladder/sphincter dysfunction assessment	**Covered when medically necessary** (documented LUTS/retention/incontinence ; neurogenic concern)
	Bladder Ultrasound (Post-Void Residual)	51798	Quantify urinary retention (PVR)	**Covered** (common first-line objective measure)
Laboratory Analysis	Vitamin B12 Level	82607	Evaluate B12 deficiency as myelopathy mimic (subacute combined degeneration)	**Covered**
	Methylmalonic Acid (MMA)	83921	Confirms functional vitamin B12 deficiency when serum B12 is equivocal or neurologic findings are disproportionate	**Covered when medically necessary** (suspected B12-related myelopathy, neuropathy, or macrocytosis)
	CSF Analysis (IgG Index/Bands)	83872	Supports diagnosis of multiple sclerosis or inflammatory demyelinating disease	**Covered when medically necessary** (suspected MS or inflammatory myelopathy with supporting clinical or imaging findings)

Clinical Assessment for Key Differentials[4,6–9]

Diagnosis/Condition	Age	Course	Clinical Features	Diagnostic Tests
Viral myelitis	Any age	Acute-subacute	Pure motor syndrome or segmental cord syndrome	MRI and CSF, EMG (general test)

Diagnosis/Condition	Age	Course	Clinical Features	Diagnostic Tests
Epidural abscess	Any age	Subacute; may worsen abruptly	Segmental cord syndrome	MRI
Vascular malformation	>40 years (dural fistula)	Acute and/or stepwise	Radiculomyelopathy	MRI, spinal angiography
Subacute combined degeneration	Any age	Slowly progressive	Dorsal cord syndrome	Vitamin B12 levels
Radiation myelopathy	Any age	Slowly progressive	Segmental cord syndrome or ventral cord syndrome	MRI, clinical history
CSF Leak (Spinal)	Any age	Acute (post-procedure /trauma) or Chronic (spontaneous)	Orthostatic headache (worsens when standing, relieves when lying down); cranial nerve palsies	MRI Spine (with/without contrast), CT Myelography (to locate the leak site)
Vascular Myelopathies (Acute Infarction, Haematomyelia, etc.) (G95.1)	Any age (often >60)	Abrupt onset/ Acute-subacute	Typically causes Anterior Cord Syndrome (sudden paraparesis, dissociated sensory loss)	MRI with diffusion-weighted sequences; Spinal Angiography (CTA/MRA)
Syringomyelia/ Syringobulbia (G95.0)	Any age (often young adult)	Slowly progressive, chronic	Central cord syndrome; loss of pain and temperature sensation in a cape-like distribution; upper extremity motor weakness	MRI Spine (to visualize the syrinx), CT Scan
Cervical spondylotic myelopathy	Usually >60 years	Progressive or stepwise course	Moderate-severe cases demonstrate gait and leg spasticity and amyotrophy of hand or arms	MRI cervical spine
Transverse myelitis (including multiple sclerosis and other causes)	Children, young adults	Subacute	Segmental cord syndrome	MRI and CSF, EMG (general test)
Autonomic Dysreflexia (AD)	Primarily SCI patients (T6 and above)	Acute, life-threatening episodes	Sudden, severe hypertension; pounding headache; diaphoresis (sweating) above the injury level; bradycardia	Clinical Recognition (monitoring blood pressure in response to stimuli); Urodynamic Studies
Cord Compression (Unspecified) (G95.2)	Any age	Varies (Acute to Chronic)	Back pain, motor weakness, sensory changes, depending on compression.	MRI Spine (to identify the cause and degree of compression); CT Scan

Diagnosis/Condition	Age	Course	Clinical Features	Diagnostic Tests
Neurogenic Bladder (Cord Bladder NOS, N31.9)	Any age	Varies (often Chronic)	Urinary incontinence, retention, frequency, urgency, or inability to sense bladder fullness	Urodynamic Studies, Bladder Ultrasound (PVR), EMG (of pelvic floor)
Myelopathy NOS/Disease of spinal cord, unspecified (G95.9)	Any age	Varies (often Progressive)	A general term for any disorder of the spinal cord where the specific cause is yet unknown or not classifiable	MRI, CSF Analysis, Blood Tests (to rule out systemic causes)
General Tests (Applies widely)	N/A	N/A	N/A	MRI spine, EMG, urodynamic studies, bladder ultrasound

Abbreviations: AD, Autonomic Dysreflexia; ALS, Amyotrophic Lateral Sclerosis; AVM, Arteriovenous Malformation; CSF, Cerebrospinal Fluid; CTA/MRA, Computed Tomography Angiography / Magnetic Resonance Angiography; EMG, Electromyography; MS, Multiple Sclerosis; NOS, Not Otherwise Specified; PVR, Post-Void Residual; SCI, Spinal Cord Injury; SCIWORA, Spinal Cord Injury Without Radiographic Abnormality; UTI, Urinary Tract Infection

Common MRI Findings in Chronic SCI[4–6,6]

- **Myelomalacia:** An ill-defined area of altered signal within the cord (bright on T2, darker on T1), indicating gliosis and tissue damage, often at the injury site
- **Syrinx (Syringomyelia):** A fluid-filled cavity (cyst) within the cord, often appearing as a T2 hyperintense oval lesion, common after injury and can cause progressive symptoms
- **Spinal Cord Atrophy:** Thinning or shrinkage of the cord, particularly at the injury level, visible on sagittal views
- **Cord Compression/Stenosis:** Persistent narrowing of the spinal canal or direct pressure on the cord from bone, disc, or scar tissue
- **Cord Tethering:** The cord appears fixed or attached to the surrounding bone/scar, limiting normal movement
- **Signal Changes (Edema/Demyelination):** High T2 signal (bright) indicates chronic inflammation, edema, or demyelination, even without acute injury
- **Disruption/Transection:** Complete absence of cord tissue, usually seen in severe, long-standing injuries

Subtle Early Signs[1,7,8]

1. Changes in Gait and Balance

- **"Heavy" or "Stiff" Legs:** Patients may describe their legs as feeling heavy or hard to move, which is often an early sign of spasticity
- **Magnetic Gait:** A subtle tendency to keep the feet "glued" to the floor or a decrease in step height
- **Frequent Near-Falls:** An increase in stumbles or a new requirement to hold onto furniture while walking (furniture walking) due to an unsteady gait

2. Loss of Fine Motor Dexterity

- **Difficulty with Fasteners:** Struggling to manipulate buttons, zippers, or jewelry that was previously handled with ease
- **Handwriting Changes:** A subtle decline in legibility or a "cramping" sensation when writing
- **Dropping Objects:** Randomly dropping keys, cups, or utensils, which may be attributed to "clumsiness" but often reflects a loss of fine motor coordination

3. Atypical Sensory Complaints

- **The "Band" Sensation:** A feeling of tightness or a "girdle" sensation around the chest or abdomen
- **Pseudo-Neuropathy:** Numbness or tingling in the hands or feet (paresthesia) that is mistaken for diabetic neuropathy but is actually caused by spinal cord compression
- **Lhermitte's Sign:** An electric shock-like sensation that travels down the spine or into the limbs when tilting the head forward

4. Subtle Autonomic Shifts

- **"Urgency" without UTI:** A new, sudden need to urinate that isn't explained by an infection or prostate issues
- **New-Onset Constipation:** A sudden change in bowel habits that doesn't respond to typical dietary changes
- **Sweating Irregularities:** Unexplained patches of dry skin (diminished sweating) below a certain level of the body

5. Physical Exam "Quiet" Indicators

- **Exaggerated Reflexes:** While aging usually *diminishes* reflexes, the presence of very "brisk" reflexes (hyperreflexia) in an older adult is a major red flag for a spinal cord issue
- **Upward Toes:** A positive Babinski sign (the big toe moves upward when the sole of the foot is stroked)

6. Common Pain and Stiffness

- **Neck/Back Pain:** Stiffness or aching that's often dismissed as arthritis
- **Radiating Pain:** Burning, aching, or tingling that travels down arms (from neck issues) or into buttocks/legs (from lower back)

Risk Factors[9–12]

Category	Specific Risk Factor	Risk Signal (Quantified Risk)	Description/Evidence Base
Anatomical/ Structural	Narrow spinal canal (Spinal Stenosis)	Relative Risk (RR): 3.0 – 5.0	Individuals with a congenital canal diameter <13mm have a significantly higher risk of developing symptomatic myelopathy

Category	Specific Risk Factor	Risk Signal (Quantified Risk)	Description/Evidence Base
Anatomical/ Structural	Higher-level spinal cord lesion	Absolute Risk: 20–30%	Approximately 25% of patients with a primary injury eventually develop Syringomyelia (fluid-filled cysts) over 20 years
Trauma/ External Forces	Spinal cord trauma or ischemia	Odds Ratio (OR): 2.5	Minor trauma in the presence of existing spondylosis carries a high risk of triggering "Central Cord Syndrome."
Demographics/ Age	Extremes of age (Elderly focus)	Prevalence: 10–15%	In patients over 60, asymptomatic cord compression is found in up to 15% of the population during routine MRI
Pre-existing Conditions	Autoimmune conditions (e.g., MS)	Absolute Risk: 80%	Up to 80% of Multiple Sclerosis patients will develop spinal cord lesions during the course of their disease
Pre-existing Conditions	Nutritional deficiencies (B12)	Incidence: <1%	While the RR is high if deficiency is present, the absolute incidence of Subacute Combined Degeneration is rare in developed nations.
Pre-existing Conditions	History of cancer/tumor	Incidence: 5–10%	Between 5% and 10% of all cancer patients develop Metastatic Epidural Spinal Cord Compression (MESCC)
Pre-existing Conditions	Vascular conditions (HTN/AVM)	Relative Risk: 2.0+	Uncontrolled hypertension is a primary risk factor for spinal cord infarction, though spinal strokes account for only 1% of all strokes

Abbreviations: AP, Anteroposterior (the front-to-back measurement of the spinal canal); AVM, Arteriovenous Malformation (vascular tangles); CCS, Central Cord Syndrome (injury causing upper-body weakness); HTN, Hypertension (high blood pressure); MESCC, Metastatic Epidural Spinal Cord Compression; MS, Multiple Sclerosis; OR, Odds Ratio (measure of association); RR, Relative Risk (probability ratio); SCD, Subacute Combined Degeneration (spinal decay from B12 deficiency); SCL, Spinal Cord Lesion

Red Flags[13]

Red Flag (Symptom)	Clinical Significance (Requires Immediate Attention)
Sudden Loss of Sensation	Suggests acute interruption of sensory pathways. People who suddenly lose sensation should go to the emergency department immediately
Sudden Motor Weakness or Paralysis	Indicates acute damage to motor tracts in the spinal cord. Sudden weakness in one or more limbs or sudden paralysis requires immediate treatment to prevent permanent damage
New-Onset Incontinence	Sudden loss of bladder control (urinary incontinence) or bowel control (fecal incontinence) is a major sign of acute spinal cord or cauda equina compression

Red Flag (Symptom)	Clinical Significance (Requires Immediate Attention)
Severe, Sudden Back Pain	Often associated with acute compressive issues like an epidural abscess, hematoma, or severe fracture, especially if accompanied by neurological deficits
Signs of Autonomic Dysreflexia (in known SCI patients T6 and above)	Acute, life-threatening spike in blood pressure (severe hypertension) with pounding headache and sweating; this is a medical emergency requiring urgent identification and removal of the triggering stimulus
Rapidly Worsening Symptoms	Any neurological symptom (weakness, numbness, pain) that progresses quickly over hours or days indicates a rapidly evolving pathology (e.g., hemorrhage, expanding abscess, or severe inflammation)
Abbreviations: AD, Autonomic Dysreflexia; ED, Emergency Department; SCI, Spinal Cord Injury; T6, Sixth Thoracic Vertebra (the neurological threshold for AD risk)	

Diagnostic Thresholds[2,13]

- **Symptom Duration** → Symptoms persisting for **≥6 months**

The G95 codes are not used for:

- **Spinal Cord Injury (Trauma):** Use the S14.1-, S24.1-, S34.1- series
- **Inflammatory/Infectious Myelitis:** Use G04 for conditions like Transverse Myelitis
- **Diseases affecting the nerves/roots:** Use the G54 block (e.g., G54.1 for Lumbar radiculopathy)

ICD-10 Code	Title/ Disease Group	When to Use (Examples)
G95.0	**Syringomyelia and syringobulbia**	Use when the patient is diagnosed with a fluid-filled cavity (syrinx) within the spinal cord (syringomyelia) or the brainstem (syringobulbia)
G95.1	**Vascular myelopathies**	Use for disorders caused by blood supply issues, such as acute spinal cord infarction, arterial thrombosis, or haematomyelia (bleeding into the cord)
G95.2	**Cord compression, unspecified**	Use when imaging confirms compression of the spinal cord, but the cause (e.g., tumor, fracture, hematoma) is unknown or not documented at the time of coding
G95.8	**Other specified diseases of spinal cord**	Use for specific, non-traumatic, non-vascular disorders that don't fit elsewhere, such as:
		* Drug-induced myelopathy
		* Radiation-induced myelopathy (Note: Use an additional external cause code (Chapter XX) to identify the agent)
G95.9	**Disease of spinal cord, unspecified**	Use as a general default code when the diagnosis is simply "myelopathy" or "disease of spinal cord" and the cause or specific type is completely unknown (Myelopathy NOS)
Abbreviations: ICD-10, International Classification of Diseases, 10th Revision; NOS, Not Otherwise Specified		

Clues to Dig Deeper[1]

1. The "Clumsy Hand" and Fine Motor Decay

While often dismissed as "arthritis," loss of dexterity is a hallmark of cervical spinal cord involvement.

- **The Button Sign:** New difficulty with small manual tasks like buttoning a shirt or using a key
- **Amyotrophy:** Noticeable wasting (atrophy) of the small muscles in the hands or arms
- **Drop Attacks of Objects:** Frequently dropping items without a clear cause of weakness or pain

2. Disproportionate Reflexes

In older adults, reflexes normally diminish; therefore, "normal" or "lively" reflexes can actually be a red flag.

- **Hyperreflexia:** Brisk or exaggerated reflexes in the legs when there is weakness
- **Pathological Reflexes:** The presence of a Babinski sign (upward toe) or Hoffman's sign (flicking the fingernail causes the thumb to twitch)
- **Spasticity:** Increased muscle tone or involuntary muscle "tightness" that develops over weeks or months

3. Sensory "Levels" and Specific Patterns

Unlike peripheral neuropathy (which usually fades in a "stocking-glove" pattern), spinal cord issues often have a distinct geographical boundary.

- **Sensory Level:** A sharp line on the trunk or limbs where sensation changes abruptly (e.g., nothing felt below the belly button)
- **Dissociated Sensory Loss:** Losing the ability to feel pain and temperature in an area (like the shoulders/arms in Syringomyelia) while still being able to feel light touch
- **Proprioception Loss:** An inability to sense where the limbs are in space, leading to an unsteady gait that worsens significantly in the dark

4. The Nature of the Pain

- **Girdle/Band Pain:** Pain that feels like a tight band or "electric belt" wrapping around the chest or abdomen
- **Lhermitte's Phenomenon:** An electric-like shock sensation that shoots down the back or into the limbs when the neck is flexed forward
- **Midline Spinal Pain:** Deep, aching pain located directly over the vertebrae, rather than in the paraspinal muscles

5. Autonomic and Sphincter Subtle Changes

- **Hesitancy or Urgency:** New difficulty starting urination or a sudden, uncontrollable urge to go that is not explained by local bladder or prostate issues
- **Diminished Sweating:** A noticeable lack of sweating below a certain point on the body, contrasted with increased sweating above that point

- **Erectile Dysfunction:** New-onset sexual dysfunction in the absence of clear vascular or psychological causes

Common Oversights

Oversight Area	Specific Mistake or Missed Diagnosis	Clinical Consequence
Misdiagnosis of Pain Origin	Mistaking central (midline) spinal pain for simple **musculoskeletal pain** (e.g., strain or spasm) or **visceral pain**	Delays critical imaging (MRI), allowing potential compression (like an abscess or tumor) to progress and cause permanent damage
Ignoring Bowel/Bladder Changes	Attributing new-onset urinary incontinence or retention solely to age, UTI, or prostate issues without performing a focused neurological exam	Misses the signs of **Cauda Equina Syndrome** or acute cord compression, which are surgical emergencies
Focusing Only on X-ray/CT in Trauma	Relying solely on X-rays or CT scans in trauma cases where the bone structure looks stable	Misses soft tissue injuries, such as **spinal cord contusions, hematomas, or ligamentous instability** (SCIWORA — Spinal Cord Injury Without Radiographic Abnormality) . MRI is often essential
Missing Specific Myelopathy Subtypes	Failing to consider non-compressive causes for neurological deficits:	
	1. Vascular Myelopathy: Attributing acute weakness to stroke or generalized weakness, missing the need for urgent diffusion-weighted MRI or angiography (CTA/MRA)	
	2. Nutritional Deficiency: Not ordering **Vitamin B12 levels** for slowly progressive dorsal column symptoms, leading to delayed treatment of **Subacute Combined Degeneration**	
Mistaking AD for Anxiety/ Hypertension	In patients with known high-level spinal cord injury (T6 or above), treating the acute, severe blood pressure spike of **Autonomic Dysreflexia (AD)** as routine hypertension or panic attack	Failure to identify and relieve the stimulus (e.g., a full bladder/bowel) can lead to stroke, seizure, or death
Dismissing Orthostatic Headache	Failing to recognize a headache that worsens when upright and is relieved when lying down as a sign of **CSF Leak**	Leads to chronic pain and inappropriate treatment instead of targeting the leak with a blood patch or surgical repair

Abbreviations: AD, Autonomic Dysreflexia; CSF, Cerebrospinal Fluid; CT, Computed Tomography; CTA/MRA, Computed Tomography Angiography/Magnetic Resonance Angiography; MRI, Magnetic Resonance Imaging; SCIWORA, Spinal Cord Injury Without Radiographic Abnormality; T6, Sixth Thoracic Vertebra; UTI, Urinary Tract Infection

Key Differentials[5,6,8]

Differential Type	Condition (ICD-10)	Key Distinguishing Features
Nerve Root Disorders	Cauda Equina Syndrome (G83.4)	Mimics conus medullaris syndrome but involves nerve roots, not the cord; causes "saddle anesthesia," leg paresis, and sphincter dysfunction
	Radiculopathy (eg, herniated disk)	Causes pain and weakness in a specific dermatomal or segmental distribution rather than a broad "sensory level"
Peripheral Neuropathies	Polyneuropathy	Typically presents with "stocking-glove" sensory loss and diminished reflexes, whereas cord disorders often cause brisk reflexes (hyperreflexia) below the lesion
	Guillain-Barré Syndrome	Characterized by rapidly ascending flaccid paresis and loss of reflexes; flaccid paresis lasting more than a few weeks suggests this rather than acute cord injury
Intrinsic Cord: Degenerative /Structural	Cervical Spondylotic Myelopathy	A chronic, progressive gait disturbance and spasticity in older adults due to age-related changes; often preserves cranial nerves
	Syringomyelia	Features a "dissociated" sensory loss (losing pain/temp but sparing touch) and a cape-like distribution of symptoms
	Compression of the Spinal Cord	External pressure from tumors, hematomas, abscesses, or herniated disks; requires quick correction to prevent permanent damage
	Cervical Spondylosis/ Myelopathy	Age-related wear of vertebrae/disks that causes narrowing of the canal; leads to slow, progressive gait spasticity and hand amyotrophy
Intrinsic Cord: Other	Multiple Sclerosis (MS)	Often fluctuates (worsens with heat) and involves extraspinal symptoms like visual disturbances or vertigo
	Subacute Combined Degeneration	Results from **Vitamin B12 deficiency;** involves dorsal cord syndrome with progressive weakness and loss of position/vibration sense
	Amyotrophic Lateral Sclerosis (ALS)	A motor neuron disease causing both upper and lower motor neuron signs (spasticity plus fasciculations) without sensory loss
Vascular	Blockage of Blood Supply (Vascular Myelopathy)	Often presents as **Anterior Cord Syndrome** with sudden paralysis but spared position/vibration sense. Includes infarction and thrombosis

Abbreviations: ALS, Amyotrophic Lateral Sclerosis; GBS, Guillain-Barré Syndrome; ICD-10, International Classification of Diseases, 10th Revision; MS, Multiple Sclerosis; SCD, Subacute Combined Degeneration

Comorbidity Screening[14–16]

1. Integumentary: Pressure Sores

Immobility significantly increases the risk of skin breakdown.

- **Daily Inspection:** Nurses and caregivers must inspect the person's skin daily for redness or sores
- **Hygiene:** The skin must be kept dry and clean at all times
- **Repositioning:** The person must be turned frequently to shift weight

- **Support Surfaces:** Use of special beds or mattress overlays (air, foam, gel, or water) to reduce pressure

2. Genitourinary: Urinary Problems and Infections

Bladder dysfunction (neurogenic bladder) often leads to retention or incontinence.

- **Catheterization:** If the person cannot use a toilet, a urinary catheter may be required
- **Infection Control:** Sterile techniques must be used during catheter insertion
- **Daily Maintenance:** Antimicrobial ointments or solutions should be applied daily to the catheter site to reduce UTI risk
- **Training:** Patients may be taught how to self-catheterize to manage long-term dysfunction

3. Respiratory: Pneumonia

Weakened respiratory muscles and immobility allow secretions to accumulate, increasing pneumonia risk.

- **Breathing Exercises:** Deep breathing exercises are taught by therapists to maintain lung capacity
- **Postural Drainage:** Placing the person at an angle to help drain secretions from the lungs
- **Suctioning:** Secretions may need to be mechanically suctioned out if the person cannot clear them independently

4. Cardiovascular: Blood Clots

Decreased circulation and lack of movement in the legs put patients at high risk for deep vein thrombosis (DVT).

- **Anticoagulants:** Medications like heparin or low molecular weight heparin may be injected to prevent clots
- **IVC Filters:** If anticoagulants are unsafe (e.g., due to ulcers or bleeding disorders), a filter — sometimes called an "umbrella" — is inserted into the inferior vena cava to trap loose clots

5. Autonomic and Regulatory Issues

- **Thermoregulatory Problems:** Patients may experience diminished sweating below the level of the spinal cord damage and compensatory increased sweating above the injury
- **Chronic Pain Syndromes:** This includes central (midline) spinal pain, "band-like" girdle pain, and musculoskeletal or visceral pain resulting from compensatory movements or internal dysfunction
- **Autonomic Dysreflexia (AD):** For injuries at or above the T6 level, patients remain at lifelong risk for this life-threatening hypertensive emergency

6. Psychosocial Comorbidities

- **Depression and Anxiety:** The extensive loss of body functions and independence is often devastating, making formal mental health counseling a critical part of chronic care
- **Loss of Self-Esteem:** Adjusting to permanent changes in mobility and body function requires significant emotional support from family and a multidisciplinary team

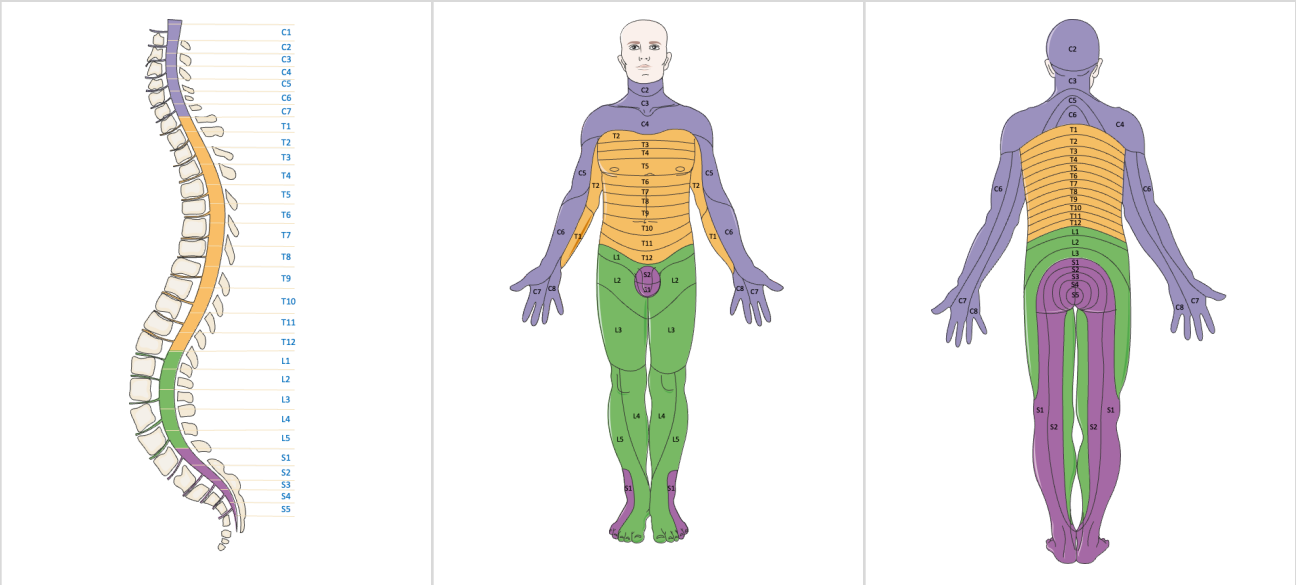
Staging/Severity Matrix[1,14,15]

The International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI), developed by the American Spinal Injury Association (ASIA) and the International Spinal Cord Society (ISCoS), are essential in evaluating SCI. To perform ISNCSCI, clinicians systematically assess sensory and motor functions. The sensory examination involves bilateral testing of 28 dermatomes using both light touch and pinprick stimuli. The sensation is graded from 0 (absent) to 2 (normal), with a comparison to the facial sensation as a reference. The most caudal dermatome demonstrating normal sensation bilaterally identifies the sensory level of injury. The motor examination evaluates 5 key muscle groups in both upper and lower limbs bilaterally. Muscle strength is graded on a scale of 0 (total paralysis) to 5 (normal strength against resistance). The motor level of injury is the lowest spinal level with at least antigravity muscle strength (score ≥3), provided all higher muscle groups are normal (score of 5).

1. Sensory Examination

- **Testing:** Clinicians test **28 dermatomes** on both sides of the body
- **Stimuli:** Both **light touch** and **pinprick** (sharp/dull) are used
- **Grading:** 0 (absent), 1 (impaired), or 2 (normal)
- **Goal:** The sensory level is the lowest point where sensation remains completely normal

Dermatomal distribution



2. Motor Examination

- **Testing:** Clinicians evaluate **10 key muscle groups** (5 in the arms, 5 in the legs)
- **Grading:** 0 (total paralysis) to 5 (normal strength against resistance)
- **Goal:** The motor level is the lowest spinal segment with at least a **Grade 3** (antigravity) strength, provided all muscles above it are **Grade 5**

3. Sacral Sparing and Completeness

- **Testing:** Clinicians check the lowest segments of the cord (**S4–S5**) via voluntary anal contraction and deep anal pressure
- **Determination:** This identifies if an injury is **Complete** (no function at the lowest segments) or **Incomplete** (some preserved function)

Injury completeness or incompleteness is then classified using the American Spinal Injury Association Impairment Scale (AIS).

American Spinal Injury Association Impairment Scale (AIS)

AIS Grade	Classification	Clinical Definition	Functional milestone
A	Complete	No motor or sensory function is preserved in the lowest sacral segments (S4–S5)	No conscious control over bowel or bladder; no sensation in the "saddle" area
B	Sensory Incomplete	Sensory function is preserved below the level of injury (extending through S4–S5), but no motor function is preserved	Can feel touch or pressure at the lowest segments, but cannot move muscles below the injury
C	Motor Incomplete	Motor function is preserved below the level of injury. More than half of key muscles have a grade less than 3 (cannot move against gravity)	Weak muscle movement exists, but limbs usually cannot support body weight without assistance
D	Motor Incomplete	Motor function is preserved below the level of injury. At least half or more of key muscles have a grade of 3 or greater (can move against gravity)	Sufficient strength is often present to allow for standing or walking with or without braces/assistive devices
E	Normal	Sensory and motor functions are normal in all segments. This applies to patients who had prior deficits but have recovered	Full return of neurological function

Abbreviations: AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association; S4–S5, Sacral segments 4 and 5 (the lowest segments of the spinal cord)

Role of Imaging for Diagnosis/Severity 1.0

Feature	Computed Tomography (CT)	Magnetic Resonance Imaging (MRI)
Primary Role	Emergency screening/Bony architecture	Cord evaluation/Soft tissue/Prognosis
Sensitivity	>98% for fractures and dislocations	Superior for ligamentous and cord pathology
Speed	Rapid (seconds); widely available	Slower (minutes); restricted access
Best For	Burst fractures, facet dislocations, bony stenosis.	Hematoma, edema, ligamentous injury, syrinx
Required Detail	<3mm (Cervical)/<5mm (Thoracolumbar)	STIR sequences for instability detection. <3mm for the cervical spine and <5mm for the thoracolumbar spine

Feature	Computed Tomography (CT)	Magnetic Resonance Imaging (MRI)
Abbreviations: CT, Computed Tomography; MRI, Magnetic Resonance Imaging; STIR, Short Tau Inversion Recovery (a specific MRI sequence used to highlight fluid/edema); SCI, Spinal Cord Injury		

Role of Imaging for Diagnosis/Severity 2.0

Finding	Clinical Action	Prognostic Outlook
Bony Compression (CT+)	Urgent Surgical Decompression	High potential for recovery if decompressed early
Cord Hemorrhage (MRI+)	Blood Pressure Management (MAP 85-90)	Guarded; higher likelihood of permanent AIS A/B status
Ligamentous Tear (STIR+)	Stabilization/Fusion Surgery	High risk of delayed deformity if not stabilized
Normal CT + Normal MRI	Consider Non-Structural Causes	Look for Vascular Myelopathy or Inflammatory Myelitis
Abbreviations: AIS, American Spinal Injury Association (ASIA) Impairment Scale; CT, Computed Tomography; MAP, Mean Arterial Pressure (Goal of 85–90 mmHg is standard for acute SCI perfusion); MRI, Magnetic Resonance Imaging; STIR, Short Tau Inversion Recovery (MRI sequence sensitive to edema and ligamentous injury)		

Advanced MRI Findings and Clinical Significance[10–12,18]

While CT identifies the fracture, MRI identifies the injury to the neural elements.

1. Acute Phase Markers (Hours to Days)

- Cord Edema: Appears as a bright (hyperintense) signal on T2-weighted images. The length of this edema is a primary predictor of recovery potential
- Intramedullary Hemorrhage: Bleeding within the cord tissue. This is a poor prognostic sign and often correlates with AIS Grade A (Complete) injuries
- Ligamentum Flavum Bulging: Indicates a loss of structural integrity that may not be apparent on CT
- Spinal cord compression/stenosis (G95.2): When pressure is put on the spinal cord, often from spinal stenosis (narrowing), bone spurs, tumors, or injury, causing symptoms like pain, weakness, numbness, tingling, and potential loss of bladder/bowel control. See table below for MRI findings

Imaging for spinal stenosis/compression in acute stage

Imaging Feature	Clinical Finding on MRI	Pathological Significance
Thecal Sac Effacement	Loss of the "white" CSF signal surrounding the cord on T2 images	Indicates severe narrowing where the protective fluid buffer is gone
Cord Contusion	Intramedullary T2 Hyperintensity (bright spot within the cord)	Signals edema, inflammation, or ischemia due to the pressure
AP Diameter	Measurement of the canal (e.g., <10mm in the cervical spine)	Quantitative evidence of "Critical Stenosis"
Myelomalacia	Focal cord thinning or "graying" of the signal on T1/T2	Represents permanent scarring or softening from chronic pressure
Abbreviations: AP, Anteroposterior (diameter); CSF, Cerebrospinal Fluid; T1, Longitudinal relaxation time (MRI sequence showing anatomy and fat); T2, Transverse relaxation time (MRI sequence where fluid/CSF appears bright white)		

2. Subacute and Chronic Phase Markers (Weeks to Months)

- Post-Traumatic Syringomyelia (Syrinx): The formation of a fluid-filled cavity within the cord that can expand over time, causing progressive neurological decline
- Progressive Ascending Myelopathy: A rare but serious finding where the level of cord damage moves upward from the original injury site

Best Practice: When is MRI Mandatory?[19–22]

Even if a CT is "negative" (normal), ACS guidelines dictate moving to MRI in these specific scenarios:

1. "Clinicoradiological Dissociation": The patient has clear neurological deficits (weakness/numbness) that the CT scan cannot explain
2. Unrelenting Pain: Significant midline spinal pain in a patient with a normal CT, suggesting a hidden ligamentous tear or "occult" instability
3. Pre-Surgical Clearance: In adults, MRI is recommended prior to surgery to differentiate between bony compression and internal cord hemorrhage, which changes the surgical approach
4. Obscured View: If the patient is unconscious or has "distracting injuries" (like severe burns or other fractures) and the spine cannot be cleared clinically

MRI vs. CT Scan

Feature	MRI (Preferred)	CT (Adjunct)
Cord Parenchyma	High Detail: Can see edema, hemorrhage, and syrinx (syringomyelia)	Poor Detail: The cord usually looks like a "gray blur"; cannot see internal damage
Acute Edema	Visible as T2 Hyperintensity (bright white)	Not visible
Compression Source	Visualizes soft tissue tumors, hematomas, and "soft" herniated disks clearly	Excellent for "hard" bony spurs or acute bone fractures

Subacute Changes	Can track Myelomalacia (softening) and cystic changes	Limited to seeing the persistent narrowing of the bony canal

Prognostic Scoring Systems

Clinicians use specific MRI-based scales to predict long-term outcomes:

- Brain and Spinal Injury Center (BASIC) Score: A 5-point scale based on axial T2 MRI findings that correlates strongly with the AIS Grade at discharge
- NLI (Neurological Level of Injury) Alignment: MRI precisely identifies the NLI, allowing for early communication regarding whether a patient will eventually be able to breathe independently or use their hands

3. MEAT Documentation Essentials

MONITOR: "Chronic Syringomyelia (G95.0) at the **C4-T2 levels**. NLI (Neurological Level of Injury) remains stable at **C4**. Sensory: Continued 'cape-like' distribution of dissociated sensory loss (loss of pain/temperature, preserved touch) across shoulders and upper back. Motor: Bilateral hand intrinsic wasting (atrophy) noted; strength 3/5 in finger abductors, 4/5 in wrist extensors. Spasticity: Modified Ashworth Scale (MAS) 1+ in lower extremities. Pain: Patient reports chronic 'burning' dysesthesia in the bilateral upper extremities, rated 6/10"

EVALUATE: "MRI C-Spine [date]: Persistent syrinx from C4 to T2. Maximum transverse diameter is **6mm** at the C6 level, representing a 1mm increase compared to [prior date]. No evidence of associated Chiari I malformation or tethered cord. Electromyography (EMG) [date]: Confirms chronic denervation in the C8-T1 distribution. Physical Therapy assessment: Noted a decline in 'clumsy hand' function and increased difficulty with fine motor tasks (buttoning shirt)"

ASSESS: "Syringomyelia (G95.0) with progressive longitudinal expansion and early functional decline. Condition is complicated by **Neuropathic Pain (G89.29)** and **Lower Motor Neuron (LMN) weakness** of the upper extremities. Current eGFR 88 (normal), but the patient is at risk for neurogenic bladder (N31.9) if syrinx continues to expand into the thoracic segments. Progression of the syrinx diameter (1mm increase in 6 months) warrants neurosurgical consultation for possible shunting vs. conservative management"

TREAT: "Started **Gabapentin 300mg TID** (titrating to 900mg TID) to address burning dysesthesia in 'cape' distribution. Initiated **Occupational Therapy** for adaptive equipment (button hooks, built-up handles) to compensate for intrinsic hand wasting. Referred to **Neurosurgery** for evaluation of syrinx expansion and potential syringoperitoneal shunt placement. Educated patient on 'insensate skin' precautions: instructed to check for burns or cuts on hands daily due to loss of pain/temperature sensation. Scheduled repeat **MRI C-spine in 6 months** to monitor cavity dimensions"

Clinical Documentation Elements

Reflecting neurologic level, functional impact, and longitudinal management:

- **Link causal clinical relationships:** Explicitly link neurologic findings and complications to the underlying spinal cord pathology (Hand intrinsic muscle wasting **due to** C8-T1 syrinx expansion)
- **Include current data:** "Anchor assessments with dated, objective findings to support monitoring" Latest Urodynamic Study [date] shows **Detrusor-Sphincter Dyssynergia (DSD)** with pressures of 45 cm H2O"
- **Specify stage precisely:** Specify diagnosis, level, and extent using accepted classification systems eg. ("Syringomyelia (G95.0) involving **C4-T2 levels")**
- **Document chronicity:** Document duration, stability, or progression, along with ongoing management strategies ("Stable chronic myelopathy; continuing long-term **Baclofen 20mg TID** for spasticity management")

Reframing Common Documentation Shortcuts

Instead of...	Document...	Why this supports clarity
"Stable syrinx"	"Syrinx G95.0 stable at 6mm (date), transverse diameter unchanged from [date] MRI"	Include current data: Provides objective comparative measurement to prove "Monitoring"
"Worsening weakness"	"Treatment Failure; AIS Grade shifted from D to C. NLI rose from T10 to T8. Scheduled neurosurgery consult."	Specify stage precisely: Uses the ISNCSCI (ASIA) standard to quantify decline
"SCI and bladder issues"	"Neurogenic bladder (N31.9) secondary to Chronic SCI (G95.81); PVR 350mL [date] justifies continued CIC"	Link clinical relationships: Connects the complication to the primary diagnosis for proper HCC Coding and management
"Refilled meds"	"Adjusted Baclofen to 20mg TID due to Modified Ashworth Scale 3+ spasticity; LFTs reviewed [date] confirm tolerance"	Document chronicity: Shows active titration and safety monitoring for a chronic condition
"Numbness in hands"	"Dissociated sensory loss (pain/temp) in C5-T1 'cape' distribution, consistent with Syringomyelia G95.0 progression"	Specify stage precisely: Links a specific physical exam finding to the pathophysiology of the syrinx

Abbreviations: AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association; CIC, Clean Intermittent Catheterization; HCC, Hierarchical Condition Category; ISNCSCI, International Standards for Neurological Classification of Spinal Cord Injury; LFTs, Liver Function Tests; MAS, Modified Ashworth Scale; MRI, Magnetic Resonance Imaging; NLI, Neurological Level of Injury; PVR, Post-Void Residual; SCI, Spinal Cord Injury; TID, Ter in die (Three times a day)

4. TREATMENT AND REFERRAL QUICK GUIDE[1,16–18]

Therapy Escalation Criteria

Treatment for spinal cord injury (SCI) is divided into three distinct phases: Acute (emergency stabilization), Subacute (preventing secondary damage), and Chronic (rehabilitation and complication management).

1. Acute Phase: Emergency Stabilization

The focus here is "Time is Spine." The goals are to restore blood flow and relieve physical Pressure on the cord:

- **Hemodynamic Management:** Maintaining a high Mean Arterial Pressure (MAP) of 85–90mmHg for the first 5–7 days. This ensures the injured cord receives enough oxygenated blood to prevent further cell death
- **Surgical Decompression:** Removing bone fragments, herniated disks, or hematomas that are squashing the cord. Early surgery (within 24 hours) is often associated with better neurological recovery
- **Spinal Realignment and Fusion:** Using metal rods, screws, and bone grafts to stabilize the vertebral column so the injury does not worsen with movement

2. Subacute Phase: Preventing Secondary Injury

After the initial trauma, a "secondary cascade" of swelling and inflammation can cause more damage than the original hit.

- **Pharmacological Intervention:**
  - Methylprednisolone: While controversial due to side effects, high-dose steroids are sometimes used within 8 hours of injury to reduce inflammation
  - Anticoagulation: Starting heparin or low-molecular-weight heparin early to prevent blood clots (DVT) in the legs, which can travel to the lungs (PE)
- **Respiratory Support:** For injuries at C4 or above, the diaphragm may be paralyzed, requiring a ventilator. Lower cervical injuries may require "cough assist" machines to clear secretions

3. Chronic Phase: Rehabilitation and Functional Recovery

This phase focuses on neuroplasticity — training the brain and remaining nerves to find new pathways.

- **Activity-Based Therapy (ABT):**
  - Locomotor Training: Using a treadmill with body-weight support to retrain the spinal cord's "stepping" circuits
  - Functional Electrical Stimulation (FES): Using small electrical pulses to trigger muscle contractions in paralyzed limbs, preventing atrophy and improving circulation
- **Assistive Technology:**
  - Occupational Therapy (OT): Relearning Activities of Daily Living (ADLs) like feeding, grooming, and driving using adaptive tools
  - Environmental Control Units (ECUs): Using voice-activated or eye-tracking technology to control home lights, temperature, and communication

4. Managing Life-Long Complications

Chronic SCI treatment is a "seamless interprofessional collaboration" to manage these specific issues:

Complication	Treatment Approach
Spasticity	**Baclofen (oral or via an implanted pump), Tizanidine, or Botulinum toxin (Botox) injections to relax stiff muscles**
Neurogenic Bladder	**Intermittent catheterization, Anticholinergics (to relax the bladder), or Botox injections into the bladder wall**
Neuropathic Pain	**Gabapentin, Pregalin, or certain antidepressants to "quiet" overactive nerve signals**
Pressure Ulcers	**Strict 2-hour turning schedules, specialized air mattresses, and high-protein nutrition for healing**

Medication Options[17,19]

Category	Common Medication Classes	Primary Purpose
Spasticity	Antispasmodics: Baclofen, Tizanidine, Dantrolene, Diazepam	Reduces involuntary muscle tightness and "jumping" by inhibiting nerve signals in the cord
Neuropathic Pain	Anticonvulsants: Gabapentin, Pregabalin. Antidepressants: Amitriptyline, Duloxetine	"Quiets" overactive pain signals (burning/stabbing sensations) caused by damaged nerves
Neuropathic Pain	Topical 5% lidocaine patches	Used for localized neuropathic pain, including chronic back pain, by numbing nerve endings to block pain signals, offering relief for shooting/burning pain and allodynia
Neurogenic Bladder	Anticholinergics: Oxybutynin, Tolterodine. Beta-3 Agonists: Mirabegron	Relaxes the bladder muscle to increase storage capacity and prevent leakage/high pressure
Neurogenic Bowel	Laxatives and Stimulants: Bisacodyl, Senna, Polyethylene Glycol (Miralax)	Ensures predictable bowel movements and prevents impaction or Autonomic Dysreflexia triggers
Orthostatic Hypotension	Vasopressors/Steroids: Midodrine, Fludrocortisone	Helps raise blood pressure in patients who feel faint when sitting upright or standing
Blood Clot Prevention	Anticoagulants: Warfarin, Pradaxa, Eliquis, Xarelto	Prevents DVT (Deep Vein Thrombosis) in patients with limited leg mobility

Abbreviations: AD, Autonomic Dysreflexia; BP, Blood Pressure; DVT, Deep Vein Thrombosis; GABA, Gamma-Aminobutyric Acid (the neurotransmitter targeted by Baclofen); HCC, Hierarchical Condition Category; MEAT, Monitor, Evaluate, Assess, Treat; SCI, Spinal Cord Injury; TID, Ter in die (Three times a day)

Medication Dosing

Medication Class	Example (Generic)	Typical Oral Dosage Range	Key Dosing Requirement

Muscle Relaxants	Baclofen	5mg 3x daily, up to 80mg/day total	Must be **tapered slowly.** Stopping abruptly can cause seizures or hallucinations
	Tizanidine	2mg to 4mg every 6–8 hours	Short-acting; often used at night because it causes significant drowsiness
Neuropathic Pain	Gabapentin	300mg/day, titrating up to 3600mg/day	Requires dose adjustment based on **renal (kidney) function**
	Pregabalin	75mg to 150mg 2x daily	Often preferred over Gabapentin for simpler twice-daily dosing
Bladder Control BP Management	Oxybutynin	5mg 2–3x daily (or 5–15mg XL)	Requires monitoring for "anticholinergic load" (dry mouth, constipation)
	Midodrine	2.5mg to 10mg 3x daily	**Timing requirement:** Do not take within 4 hours of bedtime to avoid high BP while lying down
Abbreviations: BP, Blood Pressure; **TID,** *Ter in die* (Three times a day); **XL,** Extended Release; **BID,** *Bis in die* (Twice a day)			

For patients who cannot tolerate the side effects of high-dose oral medications, delivery methods change the "dose requirement" significantly.

1. Intrathecal Baclofen (ITB) Pump

- Requirement: A "Trial Dose" is required first. A clinician injects a tiny amount into the spine to see if the legs relax
- Dose Comparison: The pump uses micrograms (e.g., 100–500mcg/day) directly in the spinal fluid, whereas oral doses are in milligrams (e.g., 40–80mg/day). This is roughly 1/100th of the oral dose, which significantly reduces brain-related side effects like "mental fog"

2. Botulinum Toxin (Botox)

- Dosing: Based on "Units" per muscle group
- Requirement: There is a maximum total body dose (usually 400 units) that can be given every 3 months to prevent the body from developing an immune resistance to the drug

Non-Rx Treatment Documentation[20,21]

Movement-based Therapy (Physiotherapy, Occupational Therapy, etc.)

These are the cornerstones of chronic care, moving beyond simple exercise to specialized neurological retraining.

- **Locomotor Training:** Utilizing body-weight-supported treadmill systems (BWSTT), therapists help move the patient's legs in a walking pattern. This provides sensory input to the spinal cord, which can stimulate "central pattern generators" to improve gait and circulation
- **Constraint-Induced Movement Therapy (CIMT):** For incomplete injuries, the "stronger" limb is restricted to force the brain and cord to strengthen the neural pathways of the "weaker" limb

- **Adaptive ADL Training:** Occupational therapists teach "compensatory strategies" for Activities of Daily Living, such as using a tenodesis grasp (using wrist extension to close the fingers) or specialized utensils for those with limited hand function
- **Pilates (Core and Stability):** Strengthens deep core muscles, improving spinal and pelvic stability, crucial for managing spinal pain
- **Chiropractic Care:** Chiropractic manipulation focuses on spinal alignment, joint mobility, and nerve relief through adjustments, often combined with massage, exercises, and therapies like decompression to ease pain, improve function

Neuromodulation and Technology

These interventions use electrical or robotic assistance to bridge the gap between the brain and the muscles.

- **Functional Electrical Stimulation (FES):** Small electrical pulses are applied to paralyzed muscles to facilitate tasks like grasping a cup or pedaling a stationary bike. This prevents "disuse atrophy" and improves cardiovascular health
- **Epidural Stimulation:** A surgical implant that applies a continuous electrical current to the lower spinal cord. While still largely in clinical trials, it has allowed some patients with complete injuries to regain voluntary movement and improved autonomic (bladder/bowel) control
- **Robotic Exoskeletons:** Wearable suits that provide mechanical power to the hips and knees, allowing patients to walk upright. This provides "physiological standing," which is proven to improve bone density and bowel regularity
- **TENS (Transcutaneous Electrical Nerve Stimulation) unit:** Can help manage chronic spinal cord disorder pain by sending mild electrical currents via skin pads to block pain signals, offering a low-risk, non-drug option, but its effectiveness varies, often requiring personalized settings (frequency, pulse width, intensity)

Autonomic and Home Management

Managing the "internal" systems of the body without drugs requires strict behavioral and mechanical routines.

- **Bowel and Bladder Programs/* Timed Voiding:** Emptying the bladder on a strict clock rather than waiting for a "full" sensation
  - Digital Stimulation: A manual technique used to trigger the defecation reflex for those with neurogenic bowel
- **Postural Drainage and Assisted Cough:** For those with weak respiratory muscles, therapists teach "quad coughing" (a caregiver applies pressure to the abdomen during a cough) or use mechanical insufflation-exsufflation devices (Cough Assist) to clear the lungs
- **Pressure Mapping and Weight Shifting:** Using high-tech seat cushions that "map" pressure points on a computer screen to help the patient identify where they need to shift their weight to prevent skin breakdown

Nutritional and Skeletal Support

- **Standing Frames:** Using a mechanical device to hold the body in an upright, weight-bearing position for 30–60 minutes a day. This is the most effective non-medication way to prevent osteoporosis and "fragility fractures" in the legs
- **High-Protein, High-Fiber Diet:** Vital for preventing the two most common reasons for re-hospitalization: skin ulcers (which need protein to heal) and fecal impaction (which requires fiber and water to move)
- **Inversion Table:** Uses gravity to decompress the spine, potentially relieving chronic back pain, sciatica, or disc issues by creating space between vertebrae

Follow-up Timing[22,23]

Follow-up care for chronic spinal cord injury (SCI) is a lifelong commitment. Because the risk of "silent" complications — such as renal failure or occult skin breakdown — is high, the schedule shifts from acute weekly checks to standardized annual "comprehensive" exams.

Phase	Timing	Primary Focus
Post-Discharge	Weeks 2, 6, and 12	Equipment fit, home accessibility, wound healing, and medication titration (e.g., Baclofen for spasticity)
Stabilization	Every 6 Months	Monitoring for "Stage 1 to Stage 2" progression, psychological adjustment, and bowel/bladder consistency
Long-term	Annually	Comprehensive "Multi-System" evaluation to prevent secondary mortality

Patient Education and Adherence[24,25]

Education is tailored to the Neurological Level of Injury (NLI) and focuses on the most common causes of re-hospitalization.

1. Autonomic Dysreflexia (AD) Recognition

Patients with injuries at T6 or above must be taught to recognize this medical emergency:

- **"Triggers":** Usually a full bladder, impacted bowel, or skin irritation (like an ingrown toenail)
- **Symptoms:** Pounding headache, sudden high blood pressure, and sweating *above* the injury level
- **Adherence tip:** Always carry an "AD Emergency Card" to show first responders, as many may not recognize the symptoms

2. Skin Integrity and The "Pressure Mapping" Concept

- **Education:** Patients must understand that they cannot feel the pain that normally tells a person to shift weight
- **Daily Routine:** Using a long-handled mirror to inspect every inch of skin (especially the tailbone, heels, and hips) twice daily
- **Adherence tip:** Set a timer for "Weight Shifts" (every 15–30 minutes in a wheelchair) and "Turning Schedules" (every 2 hours in bed)

3. Neurogenic Bladder and Bowel Management

- **Bowel program:** Education on the use of digital stimulation, suppositories, and high-fiber diets to maintain a predictable schedule and prevent accidents
- **Bladder hygiene:** If using intermittent catheterization, strict adherence to sterile techniques is the only way to prevent chronic UTIs

Adherence Strategies

Barrier to Adherence	Solution/Strategy
Complexity of Routine	Use Checklists and Apps specifically designed for SCI care (e.g., bladder/bowel logs)
Physical Fatigue	Environmental Control Units (ECUs): Voice-activated systems that reduce the physical effort needed to manage the home
Psychological Burnout	Peer Mentorship: Connecting the patient with someone living with a similar injury level to share "real-world" tips
Caregiver Strain	Respite Care and Education: Training family members to perform postural drainage and skin checks to share the responsibility

Comorbidity Management[26–28]

System	Primary Risk	Key Non-Medication Treatment
Respiratory	Pneumonia	Assisted Coughing/Postural Drainage
Urinary	Kidney Failure	Timed Catheterization/Renal Ultrasound
Integumentary	Sepsis (from sores)	Pressure Mapping/2-Hour Turns
Skeletal	Fragility Fractures	Standing Frames/Weight-bearing
Vascular	Blood Clots (DVT)	Compression Stockings/Range of Motion

Cost-Smart Options

Condition	Preferred Generic Medication	Est. Monthly Cost (No Insurance)	Benefit/Target Symptom
Neuropathic Pain	**Gabapentin**	$11 – $24	Reduces "burning" or electric nerve pain
Neuropathic Pain	**Pregabalin**	$15 – $30	More potent alternative to Gabapentin; FDA approved for SCI pain
Spasticity	**Baclofen**	$20 – $50	First-line for muscle spasms and rigidity
Spasticity	**Tizanidine**	$4 – $48	Short-acting antispasmodic; good for nighttime use
Bladder Control	**Oxybutynin**	$5 – $10	Reduces bladder spasms to prevent leakage

Sleep/Nerve Pain	**Amitriptyline**	$2 – $20	Helps with sleep and chronic "cape" distribution pain
Bone Health	**Alendronate**	$10 – $20	Prevents osteoporosis and fragility fractures

Quality Metrics Tie-In[29]

HEDIS/STAR Domain	Specific SCI/SCD Metric Tie-In	Documentation Requirement
Safety (PCR)	Plan All-Cause Readmission **3x weighted**: SCI patients have 3x the average readmission rate	Document a post-discharge visit within 7–14 days focusing on medication reconciliation and skin/bladder status
Chronic Care (OMW)	Osteoporosis Management: 80% of SCI patients develop sublesional osteoporosis	Document a DXA Scan (distal femur/proximal tibia) and initiation of bone-modifying therapy if indicated
ED Follow-Up (FMC)	Follow-Up After ER Visit: High rates of "crisis" visits for Autonomic Dysreflexia (AD) or UTIs	Document a 7 day follow-up visit/plan and the provision of an AD Wallet Card or emergency bowel/bladder plan
Prevention (BCS/COL)	Access Barriers: SCI patients often face physical barriers to screening (e.g., mammography/colonoscopy)	Document successful completion or "Medical Reason for Exclusion" (e.g., severe spasticity or skin breakdown) to protect HEDIS denominators
Patient Experience (CAHPS)	Care Coordination: Measuring how well the primary care team manages specialists (Physiatry, Urology, Wound Care)	Use the SCI-QOL or SCIM to objectively track and document functional improvements

Abbreviations: AD, Autonomic Dysreflexia; BCS, Breast Cancer Screening; CAHPS, Consumer Assessment of Healthcare Providers and Systems; COL, Colorectal Cancer Screening; DXA, Dual-Energy X-ray Absorptiometry; FMC, Follow-Up After Emergency Department Visit for People with Multiple High-Risk Chronic Conditions; HEDIS, Healthcare Effectiveness Data and Information Set; OMW, Osteoporosis Management in Women Who Had a Fracture; PCR, Plan All-Cause Readmissions; SCD, Spinal Cord Disease; SCI, Spinal Cord Injury; SCIM, Spinal Cord Independence Measure; SCI-QOL, Spinal Cord Injury—Quality of Life; STAR, CMS Star Ratings

Measure	Target	Impact
Annual Upper Tract Imaging (US)	>90%	Key surveillance for asymptomatic hydronephrosis or renal stones; prevents stage G5 renal failure
Annual Skin and Risk Assessment	100%	Prevents high-cost Stage III/IV pressure injuries; a major driver of SCI-related hospitalizations
PVR and Urodynamics (UDS)	>80%	Validates bladder safety (leak point pressure <40 cm); prevents upper tract deterioration and urosepsis
AD Wallet Card/ Education	100%	Essential for injuries T6 and above; reduces "crisis" ER visits and risk of stroke from autonomic dysreflexia

Abbreviations: AD, Autonomic Dysreflexia; PVR, Post-Void Residual; SCI, Spinal Cord Injury; SCIM, Spinal Cord Independence Measure; UDS, Urodynamic Study; US, Ultrasound

5. CODING REMINDERS AND CASE EXAMPLES BOX[30]

Specificity Requirements

Critical Element	Clinical Requirement	Example Documentation
Stage and Level	Use the **ASIA Impairment Scale (AIS)** and **Neurological Level of Injury (NLI)**	**AIS Grade C, NLI at C6.** Documenting the specific level and completeness is vital for Risk Adjustment
Etiology	Link the disorder to its underlying cause (Traumatic vs. Non-traumatic)	**Post-traumatic Syringomyelia (G95.0)** following C-spine fracture (S12.0)
Validation Data	Include specific findings such as syrinx dimensions or motor grades.	**MRI (date):** 6 mm syrinx at C5-C7; stable compared to prior. This satisfies the **Monitor and Evaluate** portions of MEAT
Complications	Explicitly link secondary conditions (e.g., bladder, skin, bone health)	**Neurogenic bladder (N31.9)** secondary to chronic SCI (G95.81); manages with **CIC**

Abbreviations: AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association; CIC, Clean Intermittent Catheterization; ISNCSCI, International Standards for Neurological Classification of Spinal Cord Injury; MEAT, Monitor, Evaluate, Assess, Treat; MRI, Magnetic Resonance Imaging; NLI, Neurological Level of Injury; SCI, Spinal Cord Injury

Annual Clinical Review and Confirmation

Confirm neurologic level, completeness, and ongoing care needs.

Requirement	Chronic Spinal Cord Disorder (SCD) Standards
Capture Frequency	**YES — Must be documented annually with MEAT by 12/31**
Face-to-Face	**Required (In-person or synchronized audio-visual telehealth counts)**
Precision	**Must specify NLI (Level) and AIS (Completeness)**
V28 RAF Impact	**HCC 180 (Quadriplegia): 1.125 (Increased - requires higher intensity care)** **HCC 181 (Paraplegia): 0.942 (Decreased - decrease in funding compared to previous model)** HCC 182 (Spinal Cord Disorders): 0.478

Abbreviations: AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association;MEAT, Monitor, Evaluate, Assess, Treat; MRI, Magnetic Resonance Imaging; NLI, Neurological Level of Injury; RAF, Risk Adjustment Factor

Good Documentation is Comprehensive Coding

If documentation shows...	Strengthen it by documenting...
"Nonspecific" Diagnosis	→ Specify Level and Grade: "Chronic SCD, AIS Grade C, NLI at C6 due to C5-C7 vertebral fracture (S12.0) with stable motor/sensory deficits"
Missing Chronicity	→ Document Narrative History: "Condition stable >12 months; post-traumatic Syringomyelia (G95.0) first diagnosed (date). Persistent sensory loss and motor weakness consistent across prior three visits"
Insufficient Evidence	→ Attach Objective Data: Include MRI dimensions (e.g., 6mm syrinx), Urodynamic Study (UDS) results showing DLPP, or EMG/NCV reports showing chronic denervation

If documentation shows...	Strengthen it by documenting...
Lack of Medical Necessity	→ Link Function to Treatment: "Patient requires CIC 5x daily for neurogenic bladder (N31.9) secondary to SCI. PVR persistently >300cc without intervention, increasing risk of urosepsis"
Inconsistent Symptoms	→ Provide Clinical Alignment: Ensure physician notes, physical therapy reports, and specialist (physiatry) findings all align with a single neurological level (e.g., C6) to avoid "cherry-picked" surveillance denials

Abbreviations: AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association; CIC, Clean Intermittent Catheterization; DLPP, Detrusor Leak Point Pressure; EMG/NCV, Electromyography and Nerve Conduction Velocity; MRI, Magnetic Resonance Imaging; NLI, Neurological Level of Injury; PVR, Post-Void Residual; SCD, Spinal Cord Disorder; SCI, Spinal Cord Injury; UDS, Urodynamic Study

EHR Tips

Feature	EHR Configuration Tip	Clinical & Quality Impact
Auto-Classification	ISNCSCI/AIS Calculator: Pulls motor/sensory exam scores to auto-calculate NLI and AIS Grade	Ensures high-specificity coding for HCC 180/181 (V28 model)
Alert Systems	Surveillance Alert: Flags if no UDS or Renal Ultrasound has been performed in the last 12 months	Prevents silent renal deterioration; supports CMS Star Ratings
BPA (Best Practice Advisory)	AD Emergency Flag: Triggers for NLI ≥T6 to ensure AD Wallet Card is provided and documented	Reduces crisis ER visits for autonomic emergencies
Problem List Prompts	"SCD Specificity" Hard-Stop: Mandatory field for "Etiology + AIS Grade" when adding G95.81 or G82.5	Reduces unspecified G82.50 coding; satisfies MEAT for risk adjustment
Outcome Tracking	SCI-QOL Integration: Automated patient portal prompts for SCI-QOL or SCIM prior to annual visits	Provides objective longitudinal data for MIPS and HEDIS reporting

Abbreviations: AD, Autonomic Dysreflexia; AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association; BPA, Best Practice Advisory; CIC, Clean Intermittent Catheterization; DLPP, Detrusor Leak Point Pressure; EHR, Electronic Health Record; HCC, Hierarchical Condition Category; ISNCSCI, International Standards for Neurological Classification of Spinal Cord Injury; MEAT, Monitor, Evaluate, Assess, Treat; MIPS, Merit-based Incentive Payment System; MRI, Magnetic Resonance Imaging; NLI, Neurological Level of Injury; PVR, Post-Void Residual; SCD, Spinal Cord Disorder; SCI-QOL, Spinal Cord Injury - Quality of Life; SCIM, Spinal Cord Independence Measure; UDS, Urodynamic Study

Brief Case Examples

SUCCESS: "64yo with chronic post-traumatic tetraplegia/quadraplegia, AIS Grade C, NLI at C6 (G82.53). MRI (10/12/2025): stable 6mm syrinx C5-C7. Manages neurogenic bladder (N31.9) with CIC 5x daily." → Captures HCC 180 (RAF ~1.125). RAF ~1.125 X $10,402.34 MA rate = Estimated $11,702.63/year.

PITFALL: "Quadriplegia/tetraplegia" documented without specifying completeness (AIS) or neurological level (NLI). No MEAT evidence (no imaging or exam levels cited)."→ Results in loss of the entire RAF weight (1.125), losing approx. $11,702/year in risk-adjusted funding.

FIX: ""Chronic paraplegia, AIS Grade B, NLI at T10 (**G82.21**) due to previous spinal cord infarct. **Chronic low back pain (M54.51)** stable on current regimen; SCIM score 65. Continued Baclofen 10mg TID for spasticity and PRN Lidocaine patches for back pain."→ Qualify HCC 181 (RAF ~0.942) & HCC 310 (RAF ~0.150). Adds approx. $9,799 +$1,560 = ~$11,359/year by satisfying MEAT criteria for annual capture.

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