Status Active PolicyStat ID 15953332

Origination	05/2023
Last Approved	06/2024
Effective	06/2024
Last Revised	05/2023
Next Review	06/2027

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Area	Shock Trauma Center
Applicability	UMMC Downtown Campus
Policy Types	Departmental Guideline

Guidelines for the Management of Patients with Acute Spinal Cord Injury

SPINAL CORD INJURIES

Neurosurgery versus Orthopedic Spine Coverage

- Cervical spinal cord injuries with deficit and cervical spine fractures without deficit with traumatic brain injury are managed by Neurosurgery
- Cervical spine injuries without deficit and injuries below the cervical region with or without deficit are managed by Ortho Spine

ASSESSMENT OF THE SPINE AND NEUROLOGIC FUNCTION

Functional Assessment

Refer to the Guidelines for the Use of the Spinal Cord Injury Flow Sheet on the STC website

http://intra.umms.org/-/media/intranets/ummc/pdfs/departments/shocktrauma/policies-and-procedures/guidelines-and-clinical-protocols/spinal-cord-injury-flowsheet-usage-guidelines.pdf?la=en&upd=20180720172152&hash=144E579358ABB504966111B73E58335169B4A7E4

Diagnostics

Refer to

- Cervical Spine Algorithm - Outpatient

- Cervical Spine Algorithm - Reliable
- Cervical Spine Algorithm - Unreliable

MANAGEMENT

Respiratory

- Use the jaw-thrust maneuver to establish an airway in the unconscious patient with a potential cervical spine injury.
- Manual in-line traction is applied to minimize neck motion during intubation.
- Monitor patient's for rate, depth, and pattern of breathing (use of accessory muscles or paradoxical breathing), strength and effectiveness of cough, and the ability to adequately oxygenate and ventilate.
- Continuous pulse oximetry and, when possible, end-tidal carbon dioxide should be monitored.
- Mucolytics (guaifenesin and nebulized acetylcysteine) may be prescribed to thin secretions decreasing the risk of mucous plugging and aid clearance.
- Inhaled bronchodilators may be used to reduce bronchoconstriction and hyperreactivity of airways.
    - Ipratropium should be limited to the acute phase because the anticholinergic effects may lead to decreased surfactant production and thickened secretions over time.
    - Beta-2 agonists (albuterol) appear to offset some of the effects of the unopposed parasympathetic stimulation - produce bronchodilation, increase heart rate, and may enhance surfactant production.
- Place an abdominal binder beneath the costal margin and over the iliac crests bilaterally to best position the diaphragm for optimal lung volumes, particularly when the patient is sitting upright. The lower portion of the binder should be tighter than the section running along the floating ribs.
- See the following Respiratory Therapy Guidelines
    - Secretion Clearance and Recruitment CSCI pathway (CSCI SCABDAP)
    - CSCI Optimizing Trach Collar Trials
    - CSCI Diaphrgmatic Pacing Stimulation
    - CSCI Extubation Considerations
    - Patients with a weak cough and who have a natural airway or are intubated but stable enough to participate in pulmonary hygiene should use an assistive (quad) cough technique to assist with clearing secretions. The patient is instructed to take three breaths; on the expiratory phase of the third breath, the nurse places the heel of the hand halfway between the patient's umbilicus and xiphoid process and thrusts in and upward while the patient coughs.

Cardiovascular

- Maintain sufficeint blood pressure
    - Avoid a systolic blood pressure below 90 mm Hg when possible and maintain a mean arterial pressure >85 mm Hg for the first 7 days after acute spinal cord injury.
        - Indications
            - In general, all ASIA A-C patients with SCI T6 or higher. Other injuries including ASIA D and those due to exacerbation of existing myelopathy would have to be discussed with the surgical and critical care teams.
        - Interventions
            - Ensure adequate intravascular volume
- Consider obtaining a Focused Rapid Echocardiographic Evaluation (FREE) or other form of echo to assess cardiac function, output, volume status and systemic vascular resistance

- If needed use vasoactive agents (e.g., norepinephrine) or inotropes (e.g., dobutamine, epinephrine). The Consortium for Spinal Cord Medicine recommends the use of agents offering both inotropic and chronotropic effects as well as vasoconstrictive properties for patients injured at the T6 and higher level (loss of cardiac sympathetic innervation). Care should be taken with pure alpha agonists such as phenylephrine as unopposed parasympathetic tone can lead to reflex bradycardia. Conversely use of pure beta agonists such as dobutamine can lead to increased vasoplegia and lower blood pressure.
- Some patients may not tolerate MAP augmentation, such as with severe cardiovascular disease, or develop dysrhythmias with norepinephrine, thus in the interest of patient safety the intervention may need to be reconsidered or discontinued.
- Place a central venous catheter if vasoactive agents are needed and an arterial line to monitor the blood pressure.
- Administer oral or enteral alpha-1 receptor agonists, such as midodrine or alpha- and beta-agonists like pseudoephedrine, to augment blood pressure and in the subacute phase, prevent orthostatic hypotension. [32,117-119]
- Avoid and treat symptomatic bradycardia
    - Monitor patient's cardiac rhythm and rate continuously.
    - Avoid rapid position changes and hypoxia (e.g., hyperoxygenate the pateint prior to passage of the suction cahteter) which can trigger bradycardia
    - Administer atropine per the prn order to treat symptomatic bradycardia
    - Consider oral/enteral beta agonist medications, such as albuterol, or alpha- and beta-agonists such as pseudoephedrine for temporary heart rate support.[32,122,123]
    - Generally, even the most serious cases of bradycardia resolve within 6 weeks of injury, and permanent cardiac pacing is rarely required.
- Deep venous thrombosis prevention – Refer to the section on spinal cord injury in the Venous Thromboembolism (VTE) Prophylaxis and Treatment Guidelines on the STC website (http://intra.umms.org/-/media/intranets/ummc/pdfs/departments/shocktrauma/policies-and-procedures/vte--guidelines-518.pdf?upd=20180719142456&la=en&hash=B1C60987ADB5387083433B05F43A56DEAF2B6EB5)
- Autonomic Dysreflexia or Autonomic Hyperreflexia - Autonomic dysreflexia is a life-threatening condition triggered by somatic or visceral stimuli below the level of the injury, classically bladder or rectal distension. If left untreated, malignant hypertension can result in intracranial hemorrhage, retinal detachment, seizures, coma, myocardial infarction, pulmonary edema, and death. Although prevention is ideal, once autonomic dysreflexia occurs, first-line therapy is to remove the stimuli. If hypertension persists, pharmacologic intervention should be instituted with calcium channel blockade or nitrates.

Temperature Regulation

- Monitor patient's core body temperature continuously.
- If hypothermic gradual warming with a hyperthermia blanket and warmed intravenous fluids can be used to restore core body temperature. Prevent overwarming.

Genitourinary

- In patients with injury above the sacral level place an indwelling bladder catheter and then follow the Spinal Cord Injury Bladder Catheter Removal protocol found on the STC website. See Attachment

Gastrointestinal

- Patients should receive routine peptic ulcer disease prophylaxis with histamine-2 receptor antagonists (preferred) or proton pump inhibitors (only if taking prior to admission or history of gastrointestinal bleed)
- Every effort should be made to meet the nutritional requirements of the patient within 72 hours is important to maintain GI integrity and provide nutritional support.[135]Placement of a transpyloric tube is recommended to facilitate enteral feeding if gastric intolerance occurs. Indirect calorimetry measures energy expenditure and guides nutritional support which may assist clinicians in setting appropriate goals.[135-138] Nutritional Services will assist with the decision to obtain and timing of indirect calorimetry.
- Before initiating oral feedings for a patient with a cervical SCI, a swallowing evaluation is often recommended especially for patients who underwent anterior approach surgeries. Patients who underwent anterior approach surgeries may be at higher risk of dysphagia.
- Unlike other critical illnesses, SCI does not manifest a hypermetabolic response, however, it does appear to produce an obligatory negative nitrogen balance most likely attributed to muscle atrophy.[136-138] To reduce the negative nitrogen balance Oxandrolone may be prescribed. http://intra.umms.org/-/media/intranets/ummc/pdfs/departments/shocktrauma/policies-and-procedures/guidelines-and-clinical-protocols/oxandrolone-guideline-18.pdf?upd=20181029183855&la=en&hash=B8804C26DC7FF861689E79CA03C143997AF73874
- Constipation can occur as a result of reduced GI motility, opioid and sedative use, and immobility. Stool softeners (docusate sodium), dulcolax suppository, laxatives (sennosides or bisacodyl) or low volume enemas may be used to evacuate the stool. Sufficient fiber, bulk forming agents and fluid intake help to to ensure stool is the desired consistency. Goal for stool consistency is to have:
- UMN lesion (Above the sacral level) goal: soft-formed stool readily evacuated with rectal stimulation
- LMN lesion (At the sacral level) goal: firm-formed stool retained between bowel care episodes and is easy to evacuate

Integument

- Remove patient from the hard backboard within two hours when possible
- If a cervical collar is likely needed for over 24 hours change the extrication collar to a well padded (Miami J) collar.
- Ensure good brace fit and provide care beneath immobilization devices or splints each shift.
- Patients with spinal cord functional deficit should be moved out of bed to a high back wheel chair with a pressure relieving cushion. Before getting the patient out of bed apply thigh high compression stockings and ace wraps to the lower extremities, as well as an abdominal binder placed blow the costal margin.
- Weight shift the patient while out of bed every 20 minutes

Pain, Anxiety and/or Depression

- Provide frequent verbal and physical contact with the patient to provide information and offer reassurance can reduce feelings of anxiety, fear, and helplessness.
- Use of sedation and analgesia cautiously in the patient breathing spontaneously to prevent impairment of the sensorimotor examination, reduction of blood pressure, and depression of respiratory drive.
- Preferably use of short-acting, reversible medications in the emergent phase of care.
- Treat nociceptive pain and neuropathic pain
- When appropriate provide a muscle relaxant
- Treat anxiety (e.g., Valium)

- Consider consulting Integrative Care
- Offer patient and family support including Social Work, Pastoral Care and Trauma Survivor's Network
- When concerns about depression or other psychiatric disorders occur, consider placing a psychiatric consult.

Sleep Promotion

- Minimize noise
- Encourage minimal interruptions overnight
- Keep lights on during the day

SPINAL COLUMN ALIGNMENT AND STABILIZATION

A plan for spinal realignment, decompression, and stabilization is established as soon as possible once the diagnostic evaluation of the spinal column and cord is complete. Surgical or nonsurgical interventions may be required.

Incomplete or unstable injuries are usually taken emergently to the OR versus complete and/or stable injuries that may be taken to the OR in an urgent but nonemergent manner.

Table 1. Pharmacotherapy for Acute Spinal Cord Injury

Drug	Dosing	Comments
Hemodynamic Management		
Norepinephrine	0.01-1 mcg/kg/min	Preferred initial vasopressor for MAP augmentation due to stimulation of both alpha and beta receptors
Dobutamine	1-5 mcg/kg/min	May be considered if inotropy desired in low cardiac output states
Epinephrine	1. 0.05 mcg/kg/min	May be considered if inotropy desired in low cardiac output states not responsive to dobutamine or when dobutamine worsens hypotension
Albuterol	Initial dosing: 2 mg po q6h (up to 6 mg po q6h)	Used for bradycardia
Midodrine	Initial dosing: 10 mg po q6h (up to 20 mg po q6h)	Used to augment BP
Pseudoephedrine	Initial dosing: 30 mg po q6h or 8h	May consider adding to midodrine for refractory hypotension or instead of albuterol for bradycardia; avoid scheduling doses later in the day, if possible as may affect sleep
Pain Management		
Acetaminophen	650-1000 mg po q6-8h	Use lower doses in patients with pre-existing hepatic insufficiency and/or elderly patients
Baclofen	Initial dosing: 5 mg po q6-8h (up to 20 mg po 6h)	For management of muscle spasms
Pregabalin	Initial dosing:	For management of neuropathic pain in

	50 mg po q8-12h (max 600 mg/ day) In patients ≥65 years may consider lower starting dose of 25 mg po q12h	incomplete SCI	
Sleep Promotion			
Melatonin	5-10 mg po qhs	May use as initial agent or in combination with trazodone	
Trazodone	Initial dosing: 50 mg po qhs (max 200 mg)	Consider lower starting dose in elderly patients	

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Attachments

SPINAL CORD INJURY - BLADDER CATHETER REMOVA 2024.ppt

Approval Signatures

Step Description	Approver	Date
Shock Trauma Quality Management	Susan Leone: Program Administrator	06/2024
Policy Owner	Karen McQuillan: Lead Clin Nurse Spec Stc	06/2024

Applicability

UMMC Downtown Campus