Acute Traumatic Spinal Cord Injury (SCI) Care Guidelines
Emergency Department Management

Inclusion Criteria: Acute Spinal Cord Injury Patients (up through the first week of injury)

Assessment: Mechanism of injury, vital signs, place patient in c-spine, neuro exam, assess and support airway, breathing and circulation. Assess any additional injuries

Laboratory: Type and Cross, CBC with platelets, PT, PTT

Radiology: Appropriate images to be determined by trauma team

Neurosurgery should be consulted immediately

Patients presenting to the ED with suspected SCI with complete or incomplete injury will undergo acute trauma evaluation by the trauma surgeon.

ED Physician Management
- Assess and support airway, breathing, circulation
- Perform serial neurological exams (to include pre and post resuscitation exam)
- Document the level of injury
- Consult neurosurgery for spine stabilization priorities
- Perform a full neurological survey as a baseline for comparison with future exams
- Optimize perfusion
  - Maintain age appropriate median MAP or greater
  - First administer crystalloid or colloid IV and consider the use of dopamine and/or norepinephrine
- Administer clotting components to correct any coagulopathy
- Administer muscle relaxants to correct any coagulopathy
- Assess and monitor for other unidentified injuries
- Order appropriate specialty bed for spine immobilization (Rotorest bed) and/or othotics per request of neurosurgery (i.e. halo or tongs)

ED Nursing Assessment and Management
- Perform Trauma Nursing Process (1° & 2° Assessment)
- Establish 2 large bore IVs, insert Foley catheter and NG tube
- Monitor neurologic status (motor function, sensation, and reflexes), vital signs, respiratory, GCS and hemodynamic status as indicated
- Notify physician of any changes in neurologic functional status, hemodynamic status, or respiratory status
- GOAL: Maintain age appropriate MAP (per MD order) to optimize perfusion
- Maintain normothermia
- Assess patient’s pain
- Assess and monitor for other unidentified injuries
- Keep HOB flat and move patient using sliding sheets
- Establish 2 large bore IVs, insert Foley catheter and NG tube
- Establish access to the airway
- Place patient in a neutral spinal alignment
- Maintain normothermia
- Monitor for unidentified injuries
- Stabilize vital signs
- Volume resuscitate and support airway and breathing
- Monitor for unidentified injuries,
- LABS: serial CBCs with platelets and coags q 6 hours and ABGs q 6 hrs
- GOAL First 24 Hours of Injury

Recommendations/ Considerations
- Loss of thoracic sympathetic innervation (T1-T5) may inhibit tachycardia and vasoconstriction as signs of hypovolemia and thus disguise hemorrhagic injuries
- During the resuscitation and critical care phases, analgesic agents and sedatives are typically required
- The use of steroids is not proven as a standard of care. Evidence of the drug’s efficacy and impact is controversial and administration is at the discretion of the neurosurgeon.
- Closely monitor respiratory status and intubate early, as indicated. For patient with unclear c-spine, collaborate with neurosurgery/anesthesia as necessary to assure proper alignment during intubation
- Monitor for autonomic dysreflexia

Respiratory Assessment
- Respiratory involvement depends on the level of injury.
  - C1-C4: Paralysis of diaphragm- will need mechanical ventilation
  - C5-T6: Paralysis of intercostals, diaphragm
  - T6-T12: Abdominal muscles paralyzed- may have some decreased function
- Monitor respiratory status including:
  - Pattern, effort, ability to cough, auscultated chest, monitor SpO2, ETCO2, blood gas, intubate as soon as clinically indicated
- Optimize respiratory status: decompress abdomen via salem sump, perform CPT, incentive spirometry, assisted coughing per MD orders

Spinal Immobilization
- Immobilize spine with c-collar and maintain until cleared by Trauma Surgeons. Refer to CHOC Pediatric Trauma C-Spine Clearance Guidelines
- Keep patient on backboard until an order is received from neurosurgeon to remove board. Maintain neutral spinal alignment for small children. Assess skin frequently. Goal to get patient off the backboard within hour (prior to transport to PICU) unless otherwise directed by neurosurgery. Set-up cervical traction and/or immobilization devices for cervical spine fractures
- Assist physician in immobilization and postural reduction of spinal fractures
- Prepare for operative intervention based on physician recommendations

Autonomic Dysreflexia (AD)

MEDICAL EMERGENCY that most commonly occurs in patients with SCI above T6. Characterized by remarkably high BP, intense HA, sweating, flushing of skin above lesion. Most commonly caused by full bladder or bowel

Management of AD: Notify the physician if suspected, treat the BP and the causative factor (noxious stimulus, i.e. bladder distention, stool impaction, skin issue), loosen tight clothing, sit patient upright (if previously cleared to do so), check for sources of pain

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Approved by Care Guidelines Committee 7/15/15

Reassess the appropriateness of Care Guidelines as condition changes and 24 hours after admission. This guideline is a tool to aid clinical decision making. It is not a standard of care. The physician should deviate from the guideline when clinical judgment so indicates.
Acute Traumatic Spinal Cord Injury (SCI) Management
Inpatient PICU
Nursing Assessment and Management

First 24 Hours of Injury
- Stabilize vital signs
- Volume resuscitate and support airway and breathing
- Monitor for unidentified injuries,
- LABS: serial CBCs with platelets and coags q 6 hours, and ABGs q 6 hrs

24-72 Hours Post Injury
- Ongoing stabilization and Monitoring/Prevention of complications associated with SCI
- Monitor for unidentified injuries

72 Hours – 1 Week Post Injury
- Rehabilitation and continued support
- Determining extent of injury/prognosis
- Transitioning patient and family into chronic phase of injury

Vital Signs and Autonomic Control
- Place CVP and A-line upon arrival to PICU (consider removing after 48 hours)
- Monitor VS continuously while in the PICU
- Goal: Maintain age appropriate MAP (per MD order) to optimize perfusion
- First administer crystalloid or colloid IV to maintain CVP 4-8 mm Hg then consider the use of dopamine and/or norepinephrine

Assess for complications including:
- Other unidentified injuries
- Loss of autonomic control, particularly in cervical or high thoracic injuries
- Bradycardia with ETT or trach suctioning due to unopposed vagal activity (thoracic sympathetic input may have been damaged)
- Neurogenic shock: loss of autonomic control/vasomotor tone
- Patient may be vasodilated, hypotensive, with a widened pulse pressure. Can last several weeks. Avoid hypotension as this can result in poor perfusion to the spine.
- Loss of temperature control

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Management of AD: Notify the physician if suspected, treat the BP and the causative factor (noxious stimulus, i.e. bladder distention, stool impaction, skin issue), loosen tight clothing, sit patient upright (if previously cleared to do so), check for sources of pain

Respiratory Assessment
- Respiratory involvement depends on the level of injury:
  - C1-C4: Paralysis of diaphragm- will need mechanical ventilation
  - C5-T6: Paralysis of intercostals, diaphragm OK- may need some form of respiratory support
  - T6-T12: Abdominal muscles paralyzed- may have some decreased function
- Monitor respiratory status including: pattern, effort, ability to cough, ausculted chest, monitor SpO2, ETCO2, blood gas, intubate as soon as clinically indicated
- Optimize respiratory status: decompress abdomen via salem sump, perform CPT, incentive spirometry, assisted coughing per MD orders

Neurologic Assessment
- Neurological assessment and documentation should be performed hourly for 1st 24 hours then per unit standard of care (if condition stabilizes):
  - Sensory level
  - Motor function
  - Glasgow coma scale
  - Pupil response (with pupillometer)

Activity/Rehabilitation
- Ensure that rehabilitation services (PT/OT/Speech) are consulted within 24 hours of admission
- Consult Hematology to collaborate on VTE prevention within 24 hours of admission (patient is at high risk)
- C-Spine precautions (with c-collar) until cleared by Trauma Services. Refer to CHOC Pediatric Trauma C-Spine Clearance Guidelines
- Place patient on specialty bed (i.e. Roto Rest bed) per provider order
- Keep patient HOB flat until otherwise ordered by neurosurgery
- Log roll with adequate personnel to turn patient while maintaining spinal alignment
- Move patient using sliding sheets with adequate number of personnel maintaining spinal alignment risk
- Apply sequential compression devices while in bed (for VTE prevention)
- Once patient is cleared by neurosurgeon to sit up:
  - Consult rehab for specialty cushion for sitting upright
  - Perform pressure relief (for 30 seconds every 30 minutes) while patient is in the sitting position

Additional Recommendations/Considerations
The use of steroids is not proven as a standard of care. Evidence of the drug’s efficacy and impact is controversial and administration is at the discretion of the neurosurgeon.

Optimal management requires the comprehensive expertise of the inter professional team. The goal of treatment is to maximize function and provide the necessary family education to allow optimal home management. Occupational therapy and physical therapy interventions should be provided throughout the continuum of care.
Acute Traumatic Spinal Cord Injury (SCI) Management
Inpatient PICU
Nursing Assessment and Management

Bladder Management (Neurogenic Bladder)

- In the early acute phase of injury (< 3 days), an indwelling catheter is indicated.
- Once the patient has stabilized and on reduced opioids, consider changing to intermittent catheterization every 4-6 hours. If bladder volumes consistently exceed expected capacity, increase frequency of intermittent catheterization and/or consider alternative bladder management method.

**Estimated pediatric bladder capacity**
(2 x age (years) + 2) x 30 = capacity (mL) for children less than 2 years old
(age (years) divided by 2 + 6) x 30 = capacity (mL) for those 2 years old or older with a normal adult capacity of approximately 500 mL

- Long term bladder management may include: use of suprapubic catheter, condom cath, continued intermittent cathets, and/or medications to reduce bladder spasm.

**Potential Complications:** recurrent UTI, renal and bladder calculi, vesico ureteric reflux, and autonomic dysreflexia. Priapism may occur in boys and is usually self-limiting and not a contraindication to catheterization. Consult urology if priapism is prolonged (>1 hour).

**Prevention of Complications:** Maintain adequate patient hydration, good hand hygiene; provide perineal care once a shift and after bowel movements (Refer to infection Prevention Policy #337: CAUTI-Prevention Strategies).

Bowel Management (Neurogenic Bowel)

- Bowel may be affected by damage to the nerves that control its function. Constipation can trigger complications such as autonomic dysreflexia. Maintain oral/nasal gastric tube to low continuous suction until GI function returns.
- Consult dietitian to assist with bowel management plan.
- H2 blocker or PPI for gastric ulcer prevention.
- Administer pro-motility medications as prescribed.
- Establish nutrition per PICU Enteral Feeding Guidelines and guidance of dietitian.

**Upon initiation of enteral nutrition, choose one of the following:**
- Docusate sodium (Colace®) PO BID, or Polyethylene glycol (Miralax™) PO at bedtime.
- IF ON OPIATES, add senna (Senokot®) PO at bedtime or may substitute Peri-Colace® (fixed dose combination of docusate sodium and senna) PO BID.

- If NO stool after 48 hrs on enteral nutrition, choose one of the following:
  - Increase Miralax™ to BID, or
  - Consider glycerin suppository or bisacodyl suppository once daily.

- If NO stool after 24 hrs of increasing Miralax™ or adding suppository, choose one of the following:
  - Start Senokot (stimulant) PO daily or BID (if not already started)
  - Consider phosphate enema.

For impaction: Contact stimulant or osmotic laxative, lubricant and assisted evacuation only if necessary.

For diarrhea: Adjust diet, reduce aperients, stool specimen, and X-ray if impaction suspected, consider probiotics.

Skin Assessment and Management

Patients with SCI are high risk for altered skin integrity due to loss of sensation of pain, pressure, temperature, and motor function.

- Place patient on specialty (Rotorest) bed as ordered.
- High risk for pressure ulcers-initiate care plan.
- Consider Mepilex border on bony prominences (i.e. scapula, sacrum, heels, elbows) to prevent pressure ulcers, discuss with PT.
- Reposition patient at least every 2 hours.
- Remove c-collar to clean skin underneath every day (manually immobilize head while collar is off).
- Assess and document full skin assessment (including under c-collar) at least once per shift.

Once patient is cleared by neurosurgeon to sit up:

- Consult rehab for specialty cushion for sitting upright.
- Perform pressure relief (for 30 seconds every 30 minutes) while patient is in the sitting position.

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References

Acute Traumatic Spinal Cord Injury Care Guideline


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