Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

Goals for the care of a Spinal Cord Injury (SCI) patient:

1. Level of spinal cord injury is confirmed and communicated to entire healthcare team
2. The patient will remain free from secondary infections [ventilator-associated pneumonia (VAP) or respiratory infection, bloodstream infection (BSI), and or catheter-associated urinary tract infection (CAUTI)].
3. The patient will not develop pressure ulcers
4. Promote an environment of safety (adequate method to communicate needs, adaptive call system for nurse, and interventions to prevent falls)
5. Patient and family will receive education regarding injury and plan of care

Trauma Alert / Admission

- ATLS protocol work-up
  - Airway/Breathing:
    - Assess need for intubation
    - If needed, Rapid Sequence Intubation per ORMC ED protocol with HiLo Evac ET-Tube
    - Sedation & Analgesia (*if intubated*): Fentanyl drip 50 mcg/h IV continuous – titrate to keep SAS 3-4
      Lorazepam 1-2 mg IV Q1H prn agitation/anxiety (SAS > 4)
  - Circulation
    - Goal MAP > 70 mmHg
    - "Labile" response to fluid challenge – maximum 2 L NS bolus
    - Norepinephrine 0.05 mcg/kg/min titrate to keep MAP > 70
- Immobilize the spine of all patients with a potential spinal injury
- ACLS protocol if needed
- Complete detailed history/physical
- Obtain initial labs: Trauma A, ABG
- Baseline CXR
- Baseline EKG
- Baseline Respiratory Mechanics: NIF, FVC, TV
- Pain management (*non-intubated*) : Fentanyl 50-100 mcg IV q1h prn pain OR Morphine 1-5 mg IV q1h prn pain
- Admission Orders
  - Utilize the Spinal Cord Injury Admission Order Set
  - Addresses all systems (respiratory, CV, skin, VTE prophylaxis, GI, bowel regimen, standard ICU orders)
  - In the ED, transfer the patient with potential spinal injury as soon as possible off the backboard onto a firm padded surface/mattress while maintaining spinal alignment

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
<u>Neurological Status</u> *Goals:* • Define level of injury • Set a baseline for sensory, motor, & reflex status	• Consider use of the Rotorest bed for patients who will require prolonged spine immobilization • Unstable spinal injured patients are to be placed on a bed with an Accumax mattress (low air loss mattresses are contraindicated prior to spine stabilization) • Once spine is stabilized may place patient on Stryker In Touch bed or low air loss mattress • Document sensory, motor, and reflex status within first 24 hours to ICU and then Q24H x 3 days • Neurosurgery/Attending to communicate level of injury to patient and family • Basic neuro assessment by nursing per unit protocol • Repeat neuro assessments after any transfer for reduction movements	• Continue current care • Basic neuro assessment by nursing per unit protocol

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
Respiratory System *Goals:* • Decrease/prevent atelectasis • Enhance clearance of secretions • Prevent pneumonia	**Monitoring parameters:** (monitor per ICU protocol) • Fever (Temperature > 38.5°C) • Change in respiratory rate • Increased work of breathing • Increased pulse rate • Increase or change in secretions (color, quantity, consistency) • Declining respiratory mechanics • Decrease in SaO_2 **Standard Monitoring Orders:** • Respiratory: FVC, NIF, TV Q-SHIFT • Vital signs per ICU protocol • Non-intubated**:** Incentive spirometer readings Q1H • Clear secreations with use of cough assist device. Endotracheal suctioning if unable to clear secretions with cough assist. **Ventilator Orders:** • Mechanical ventilator orders per RT/SCC protocol • Consider using higher tidal volumes (10-15 ml/kg) to resolve or prevent atelectasis • Begin weaning ventilator per protocol	**Monitoring parameters:** (per unit protocol) • Same as Phase 1 • Respiratory & ST to assess need for in-line Passy Muir Valve (PMV) **Standard Monitoring Orders:** • Respiratory: FVT, NIF, TV Q-SHIFT (decrease to Q24H if stable x 72 hours) • Vital signs per unit protocol • Non-intubated/trached: Incentive spirometer readings Q1H **Ventilator Orders:** • Continue weaning per protocol • Consider larger TV ventilation • For C1-C4 quadriplegics, consider diaphragmatic pacer placement to facilitate ventilator weaning (Consult Dr. Portee for a phrenic NCS)
	Standard Respiratory Care for all VENTILATED SCI Patients: • VAP protocol (oral care Q4H, HOB>30°, etc) • Peridex oral rinse 15mL swish & suction Q6H • Metaneb Q4H • Cough Assist device Q4H • Fomoterol (Foradil®) 20mcg nebulized Q12H • Albuterol 2.5mg/3mL nebulized Q4H • Abdominal binder when OOB to chair • Assess need for respiratory suctioning frequently to avoid mucous plugs	**Standard Respiratory Care for all VENTILATED SCI Patients:** • Continue current care • If minimal to no secretions, change albuterol to PRN

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
Respiratory System (continued)	**Standard Respiratory Care for all NON-VENTILATED SCI Patients WITHOUT evidence of respiratory compromise/ disease:** • Monitor for need for mechanical ventilation (respiratory failure, intractable atelectasis on CXR, etc) • EZ-PAP Q4H • Cough Assist Device Q4H • Peridex oral rinse 15mL swish & spit/suction QID PC/HS • Albuterol 2.5mg/3mL nebulized Q4H prn increased secretions **NON-VENTILATED SCI Patients "aggressive protocol" WITH history of smoking/respiratory disease OR increased secretions / change in pulmonary function:** • Assess for need for NT suctioning • Discontinue EZ-PAP • Metaneb Q4H • Cough Assist Device Q4H • Peridex oral rinse 15mL swish & spit/suction QID PC/HS • Salmeterol (Serevent®) 50mcg inhaled Q12H • Albuterol 2.5mg/3mL nebulized Q4H • Abdominal binder when OOB to chair	**Standard Respiratory Care for all NON-VENTILATED SCI Patients WITHOUT evidence of respiratory compromise/ disease:** • Discontinue Peridex when patient tolerating PO diet • Continue current care • Discontinue albuterol if not needed for > 72 hours **NON-VENTILATED SCI Patients on "aggressive protocol"** • Discontinue Peridex when patient tolerating PO diet • Assess for need for NT suctioning • Continue current care • When improved mechanics, switch Metaneb to EZ-PAP • If minimal to no secretions, change albuterol to PRN
	Thick Secretions • Add heated humidification to ventilator circuit • Mucomyst 10% 3mL nebulized Q4H or Q6H • Consider bronchoscopy/BAL	**Thick Secretions** • Continue current therapy • Discontinue Mucomyst when secretions become thin

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)

Cardiac
Goals:
• Restore normal hemodynamic parameters
• Goal MAP > 70
• Goal HR > 60
	Monitoring Parameters
	• Bradycardia (HR < 60)
	• Hypotension (MAP < 70)
	
	Hypotension
	• NS 2L IV – only for trauma bay resuscitation
	• Norepinephrine 0.05mcg/kg/min – titrate to keep MAP >70
	• Apply Ted hose and ACE wraps to BLE prior to assisting OOB to chair – remove when back to bed
	• SCDs while in bed
	
	Bradycardia
	• Assess need for respiratory suctioning frequently to avoid mucous plugs
	• Ambu-bag with FiO_2 1.0
	• Atropine 0.5mg IV Q1H PRN HR < 40
	• Norepinephrine 0.05mcg/kg/min – titrate to keep MAP>70
	If develops symptoms of bradycarda, consider starting:
	• Robinul 0.1-0.2mg IV Q8H to Q12H (or Robinul 1-2mg PO/PT Q8H to Q12H)
	• OR External pacing or temporary pacemaker for persistent bradycardia to maintain HR > 60
		Monitoring Parameters
		• Same as Phase 1
		• Assess for signs and symptoms of Autonomic Dysreflexia (wrinkles, bowel, and bladder)
		
		Hypotension
		• Norepinephrine must be off prior to transfer from ICU
		• Midodrine 5mg po TID (0800/1200/1600)
		• *Alternative therapies for persistent hypotension:*
		  o Sodium chloride (NaCl) tabs to maintain serum Na 140-145 mEq/L
		  o Fludrocortisone (Florinef) 0.1mg PO/PT Q12H (may increase dose and frequency)
		• Apply Ted Hose and ACE wraps to BLE prior to assisting OOB to chair – remove when back in bed
		• SCDs while in bed
		
		Bradycardia
		• Continue aggressive pulmonary toilet
		• Robinul 0.1-0.2mg IV Q8H to Q12H (or Robinul 1-2mg PO/PT Q8H to Q12H)
		• *If not responding to Robinul or an adverse event to Robinul, may consider:* Caffeine 200mg PO/PT Q12H x 3 days
		• Consider permanent pacemaker for persistent bradycardia or frequent asystole

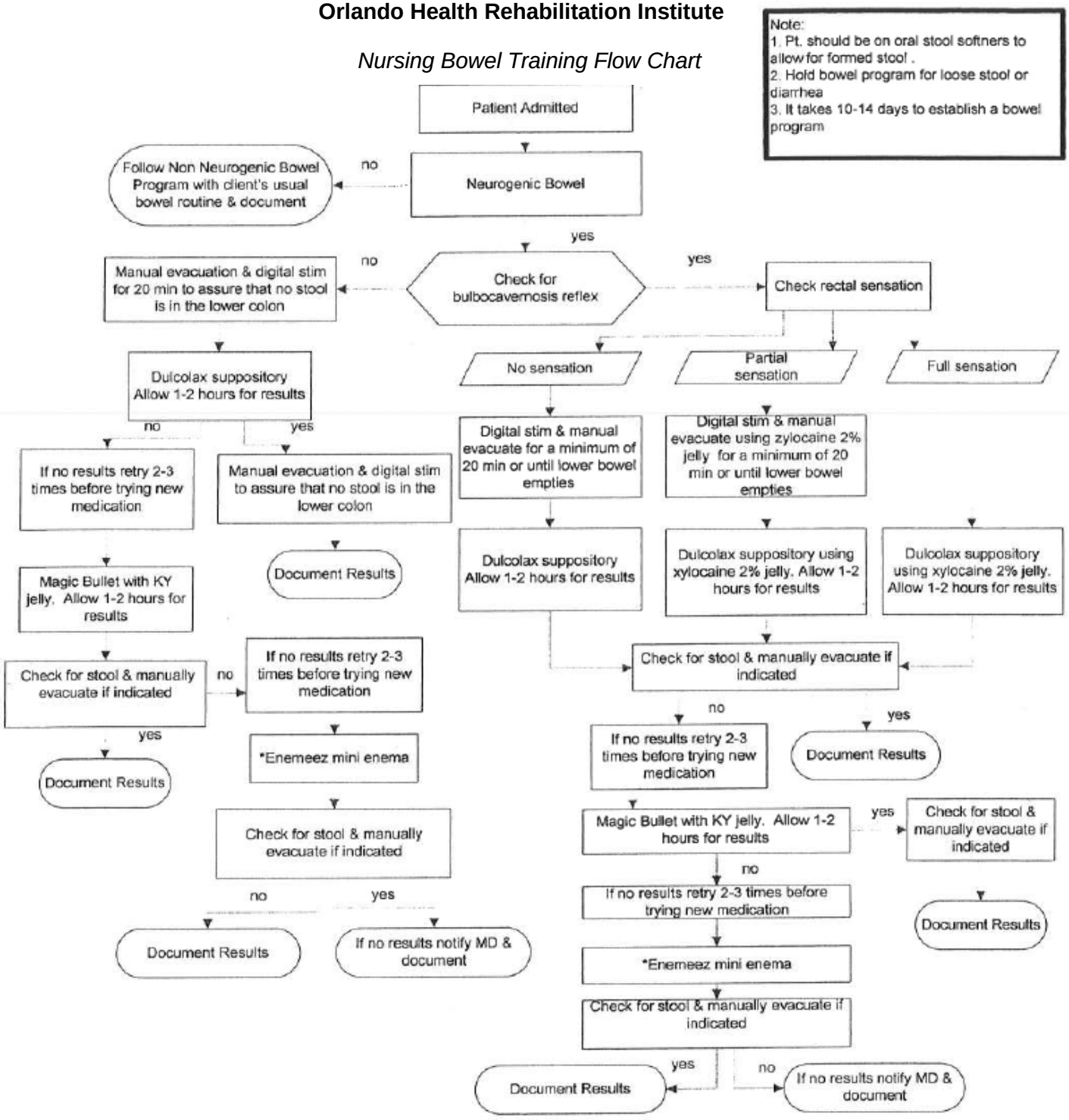
Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
Gastrointestinal Goals: • Normal gastric emptying • Tolerate enteral (gastric) or oral feeding • Scheduled BM • Minimal diarrhea / constipation Review OH Bowel Training Flow Chart (next page)	**Monitoring Parameters:** • If NG/PEG: check residuals Q4H – Goal < 250mL • Monitor for s/sx N/V • Goal 1 BM daily – document on nursing flowsheet	**Monitoring Parameters:** • Same as Phase 1
	Stress Ulcer Prophylaxis: • Pepcid 20mg IV/PT/PO Q12H	**Stress Ulcer Prophylaxis:** • Continue as long as the patient remains on the ventilator • Discontinue when the patient is off the ventilator and tolerating tube feeds at goal or regular diet x 48 hours
	Gastric Emptying / Tube Feeding Intolerance (residuals >250mL/4h): • If PEG/NG feeding – change to post-pyloric DHT (placed into the duodenum) • If persistant high residuals, add a prokinetic agent (e.g. metoclopramide, erythromycin, etc)	**Gastric Emptying / Tube Feeding Intolerance (residuals >250mL/4h):** • Continue to monitor residuals • Discontinue prokinetic agent when the patient is at goal tube feed rate x 48 hours with residuals < 250 mL/4h
	Bowel Regimen – Prevent/Treat Constipation: • Per Tube: Senna 10mL PT Q12H Docusate Sodium (Colace) 100mg PT Q12H • PO: Senna-S 2 PO Q12H • Bisacodyl 10mg PR Daily (2000) with digital stimulation – only discontinue if excessive diarrhea *If No BM by 72 hours after admission:* • Sorbitol 30mL PO/PT Q12H until 1st BM • Increase Bisacodyl (Dulcolax) to Q12H • Miralax 17g PO/PT daily	**Bowel Regimen – Prevent/Treat Constipation:** • If no diarrhea and having daily BM, continue current regimen • Switch to PO regimen if patient transitions from tube feeds to oral diet • Follow Phase 1 recommendations for constipation
	Diarrhea (liquid >500mL q8h and/or >3 stools/day for 2 days): • Hold bowel regimen • Metamucil 1pkt PO/PT Q12H	**Diarrhea (liquid >500mL q8h and/or >3 stools/day for 2 days):** • Same as Phase 1 • Resume Docusate Sodium (Colace) & Bisacodyl (Dulcolax) 1st – then add Senna if constipation becoming an issue

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

Orlando Health Rehabilitation Institute

Nursing Bowel Training Flow Chart



- Note: digital stimulation is performed by inserting index finger to the first bend in client's rectum and rotating finger in clockwise motion
- Manual evacuation = using index finger, remove stool from the lower bowel
- Document the stool amount, the consistency and odor and the amount of assistance given by the patient
- No patient especially spinal cord patients should be allowed to have unsuccessful bowel programs for more than 48-72 hours. If they do not have autonomic dysreflexia, which is very likely to occur, use 3 Dulcolax tablets or magnesium citrate to clean them out immediately.
- All documentation should be in sunrise on the bowel program and assessment flow sheet or on the bowel program training form and daily flow sheet
- If a patient is having accidents, the bowel program is not effective. Discuss with MD.
- After an accident have patient return to room to stimulate and empty bowel.
- Try all suppositories for 2-3 programs before changing to another
- *If patient experiencing pain and/or dysreflexia with bowel program, use Enemeez Plus mini enema which includes an analgesic

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
Nutrition *Goal:* • Maintain or improve nutritional status • Minimize weight loss	• Consult Speech and Language Pathology for swallow evaluation prior to initiating any oral intake in any SCI patient with cervical spinal cord injury, prolonged intubation, tracheostomy, halo fixation, or after any cervical spine surgery. • Obtain feeding access and initiate enteral support within 48 hours • Dietitian consult for intervention to assess for calorie and protein needs • Consider metabolic cart and 24 hour urine studies • Prealbumin qSunday until therapeutic/stable • Maintain normoglycemia (Blood Glucose < 180) o Bedside glucose Q6H on enteral nutrition o Bedside glucose AC/HS on oral diet	• Continue current diet orders • Dietitian to continue to monitor/intervene as per consult • Transition to oral diet with oral supplements when passes swallow study for tracheostomy patients • Discontinue sliding scale insulin & bedside glucose measurements if all < 180 x 24hours on full enteral or oral diet
Bladder **Goals:** • No CAUTI • Prevent autonomic dysreflexia	• Insert Foley catheter • Daily Foley cath care with soap and water or packaged washcloth • Assess Foley catheter Q1H – ensure urine draining freely and tubing free of kinks	• Discontinue Foley catheter if no longer requiring IVF • Do not use condom cath • If able to void, check post void residual with bladder scanner. If > 300mL straight cath • Sterile Straight cath every 4-6 hours • Goal is to obtain 400 ml per straight cath • If > 400 increase to every 4 hours • If < 400 cath in 6 hours

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
Skin Care/Prevention *Goals:* • Place appropriate cervical collar • Prevent pressure ulcers	• Cervical Collar o Remove EMS collar o Place Aspen Vista cervical collar or as ordered per neurosurgery o Cervical collar care per Orlando Health standard • Consult Wound Management • Initiate the Pressure Ulcer Prevention Order Set o Minimal sheets under patient o Moisturize dry skin q12h o Moisture barrier q12h o Turn q2h while in bed using foam wedge for lateral positioning o Weight shift/reposition q15-30min while up in chair o Assess skin qshift and prn • Place on low air loss mattress/pressure redistribution after spine stabilization and neurosurgical clearance • Place Mepilex Sacral Silicon Dressing to coccyx/sacrum – reassess Q-shift and change Q-3-5 days.	• Continue current skin care measures • Cervical collar care per Orlando Health standard • Low air loss/pressure redistribution mattress or as determined by the interdisciplinary team for function and prevention
PT/OT/ST Rehabilitation & Mobility Plan *Goals:* • Increase functional ability • Minimize contractures, etc.	• Consult PT/OT/ST • Obtain proper environmental controls. • Post Education sheets in room. • Apply Prevalon boots to bilateral lower extremities – remove Q-shift and moisturize skin • Out of bed to wheelchair (W/C) Q24H managing physicians & neurosurgery approves as patient tolerates o Roho cushion at all times in chair when OOB o Pressure relief protocol when pt in W/C (recline fully every 30 min for 60 sec and return to full upright). • Passy Muir Valve (PMV) trials as soon as pt can tolerate even short periods of wear. • Participate in family meetings. • Chest PT when pt sitting on edge of bed.	• PT/OT to assess need for orthotics for UE/LE • Respiratory & ST to assess need for in-line PMV

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
VTE Prevention *Goal:* • Prevent VTE	• SCD's to bilateral lower extremities • Lovenox 30mg SQ Q12H – start ASAP if no surgical fixation or 72 hours after spinal stabilization surgery • *Alternative:* Heparin 5000units SQ Q8H (poor renal function) • Consider permanent IVC filter placement, especially if delay in starting chemical prophylaxis – no quad coughing for 3 days after placement	• Continue SCDs while in bed • Continue Lovenox – minimum 6 weeks of therapy • Consider permanent IVC filter placement if not placed in ICU
Psychosocial *Goal(s):* • Foster effective coping strategies • Provide SCI education to patient & family	• Consult Family and Patient Counseling • Consult Chaplain • Provide patient & family with a packet on SCI education, communication, and steps of grief	• Complete a baseline assessment of coping skills/ adjustment to injuries • Show *Understanding Spinal Cord Injury* video • Child life for patient (if <18) or family (if siblings) • Pet Therapy • Volunteer Services for distraction • Adaptive equipment • Promote rest between MN and 0600

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)
Pain/Spasticity Treatment *Goals:* • Attain adequate pain control • Minimize side effects associated with analgesic agents • Decrease post-SCI spasticity • Improve participation with PT/OT/ST/ADL	**Monitoring Parameters** • Pain score via visual/analogue scale • SAS score (goal 4) • Spasticity – compliance with PT/OT **Pain** ***Neuropathic Pain*** • Gabapentin 100mg PO/PTq8 x 24h, then 200mg PO/PT q8 x 24h, then 300mg PO/PT q8; may increase to max 2400mg/d over 2-3 weeks OR • Pregabalin 75mg po q12h, may increase to max 300mg po q12h over 1-2 weeks (adjust for renal dysfunction) *Consider the following if also treating depression:* • Amitriptyline 25mg po qhs, may increase to max 100mg over 1 week ***Generalized Pain*** *Mild pain:* • Acetaminophen 650mg PO/PT/PR Q6H prn pain • Ibuprofen 800mg PO/PT Q6H prn pain (clear with neurosurgery first) *Moderate pain:* • Tramadol 50mg PO/PT Q4H prn pain *Severe pain:* • Enteral: Oxycodone 5-10mg PT Q4H prn pain PO: Percocet 5/325mg 1-2 PO Q4H prn pain **Spasticity** • Baclofen 10mg PO TID (while awake) – max 120mg/day • 2nd line: Tizanidine 2mg PO Q6H – max 36mg/day	**Monitoring Parameters** • Same as Phase 1 **Pain** ***Neuropathic Pain*** • Continue to titrate medication as needed to specified maximum doses; if symptoms improve, consider weaning • Both gabapentin or pregabalin should be weaned off over 1-2 weeks before discontinuing ***Generalized Pain*** • If severe, intractable pain, may increase opioid dose – the goal, however, is to achieve control with lowest possible dose • Continue current therapy with the goal to wean or discontinue opioids and/or benzodiazepines as quickly as possible to minimize respiratory & GI side effects • De-escalate patients (EX: from Percocet → tramadol) as soon as possible **Spasticity** • Monitor response to therapy (flexibility, ability to participate in PT/OT) • Initiate or titrate therapy as appropriate per Phase 1 recommendations *If no response to baclofen or limited response to tizanidine:* • Dantrolene 25mg PO Q24H – may titrate every 7 days to a max of 400mg/day

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

	Muscle Relaxants • Carisoprodol 350mg PO Q6H PRN muscle spasms • Cyclobenzaprine 10mg PO Q8H PRN muscle spasms	**Muscle Relaxants** • Continue current therapy • Monitor response to therapy • Titrate to lowest possible dose
	Phase 1 Critical Care Unit (NSICU, TICU, MSICU)	**Phase 2 De-escalation of Therapy (TSDU, Neuro 8A/C)**
D/C Planning/Consults *Goals:* • Decrease readmissions • Increase capture rate • Decrease length of stay	• Consult Social Worker on admission • Educate patient and family on goals/progress/plan • SCI team huddle weekly (CNS Trauma/Neuro Critical Care to coordinate) o Address on-going patient, family, and interdisciplinary team issues to better facilitate SCI patient care o Educate patient & family on goals, progress, plan o Prior to transfer from one level of care to another, incorporate team members from the next level • Consult Physiatrist (PM&R) • ORHI Scripting for rehab placement	• Continue discharge planning • SCI team huddle weekly (CNS / CNL Trauma-Stepdown to coordinate) o Address on-going patient, family, and interdisciplinary team issues to better facilitate SCI patient care o Educate patient & family on goals, progress, plan o Prior to transfer from one level of care to another, incorporate team members from the next level

Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline

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