### Spinal Fusion for Neuromuscular Scoliosis Care Guideline

#### Inclusion Criteria:
- Spinal Fusion for Neuromuscular Scoliosis

#### Exclusion Criteria:
- Spinal Fusion for Adolescent Idiopathic Scoliosis,
- Spinal Fusion for other indications

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#### Postoperative Assessment
- VS with BP and Pain Assessment per unit standards of care
- Neurovascular assessment with vital signs
- ICU: CVP, arterial line, cardio-respiratory monitoring
- Continuous pulse oximetry (while on PCA)
- Daily CXR until chest tube removed
- Labs: Hgb/Hct daily x 3 d

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#### Postoperative Interventions
- IV Fluids as ordered
- Consult Pulmonary, if not completed preoperatively
- Respiratory Therapy: Supplemental low flow oxygen therapy to maintain SpO2 >92%. Optimal pulmonary hygiene; prevention of post op atelectasis
- Wound Care:
  - Change Dressing per MD order. Note: If dressing soiled or bloody, change as soon as possible. If sutures or staples: Cleanse wound with CHG chlorascrub
  - Sequential compression device x 3 days (continuously while in bed)
  - Constavac suction as ordered; reinfusion per protocol
  - D/C central line, arterial line, prior to transfer to floor
- Maintain foley catheter until discontinued by Ortho team

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#### Dietary/Clinical Nutrition
- POD 0-1: NPO for at least 36 hours post-op, or until bowel sounds are normal (Exception: seizure medications and baclofen)( if G.T.T. : meds only by G.T.T. during NPO status)
- POD 2: PO fed: if bowel sounds normal,begin clear liquids; advance as tolerated to pre-procedure diet. Enterally fed: if bowel sounds normal, clarify home tube feeding schedule
- Advance per Enteral Protocol, if applicable (see page 3 of 3)

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#### Medication Management
- **Antibiotic Prophylaxis**
  - Cefepime 50 mg/kg IV q8h x 24 hours (<40 kg)
  - 2000 mg IV q8h x 24 hours (>40 kg)
  - AND Vancomycin 15 mg/kg IV q6h x 24 hours (<50 kg)
  - 1000mg IV q8h x 24 hours (>50 kg)
- **Pain Management** (see page 2 of 3)
  - Hydrodromphine (Dilaudid) continuous and/or demand Breakthrough pain dosing per severity of pain
- POD 1-2: When tolerating feeds, start oral/feeding tube pain medications. After tolerating initial pain medication dose, taper PCA continuous until discontinued.
- POD 3: continue transition off IV pain medication
- POD 4-5: monitor off IV pain meds x 24 h
- **Antiemetic**
  - Ondansetron 0.1 mg/kg/dose IV q8h prn (<40kg);
  - 4 mg IV q8h prn (> 40kg)
- **Stool Softener/Laxative**
  - Assess, daily, potential need related to opioid use for pain management

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#### Activity/PT
- 1st 12 hours: Strict bedrest; keep flat (log rolling okay if cleared by MD)
- After 12 hours: May elevate HOB, as tolerated
- POD 1: PT evaluation ( may be postponed to POD day 2, depending on patient’s clinical status)
- POD 1-3: Progress as tolerated with out of bed activity under supervision of PT

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#### Discharge Criteria
- Off all IV pain meds x 24 h
- Pain controlled with oral/G.T.T. pain meds only
- Tolerating pre procedure diet
- Meets PT d/c criteria (family/caregiver independent assisting with mobility at home)
- Normal VS
- Returned to prior bladder function
- Bowel function addressed

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#### Recommendations/Considerations
- Notify ortho team prior to blood transfusion if Hgb >7 and pt asymptomatic of anemia
- Consider Infectious Disease, Neurology, Nutrition, Pain, Pulmonary, RT, and Dental consults
- Indications for extending antibiotic prophylaxis beyond 24 hours post op described in CHOC Children’s “Antibiotic Prophylaxis for Surgery Guideline”
- Central line care per CVAD (Central Vascular Access Devices) procedure, available on PAWS; Web Tools; Mosby’s Nursing Tool; Mosby’s Skills
- Mosby’s Skills “Pain Management (Pediatric)” and Mosby’s Skills “Pain Assessment Scales (Pediatric)” include nursing assessment/interventions for pain management

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#### Patient/Family Education
- “Spine Discharge Instructions” (located on School House: Patient and Family Education: Scoliosis Packet)
- Instruct family on SSI, CAUTI, CLABSI, and VAP

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Reassess the appropriateness of Care Guidelines as condition changes and 24 hrs 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.
Dilaudid (Hydromorphone)

Loading dose for pain score > 4:
- <50 kg: Dilaudid (Hydromorphone) 0.01mg/kg one time prior to starting PCA
- 50 kg or >: Dilaudid (Hydromorphone) 0.5mg one time prior to starting PCA

Dilaudid (Hydromorphone) continuous and/or demand PCA
- <50 kg: continuous rate: 0.002 – 0.003 mg/kg/hr; demand dose: 0.003-0.004mg/kg/dose
- 50 kg or >: continuous rate: 0.1 – 0.2 mg/hr; demand dose: 0.2 – 0.3 mg/dose

PCA lockout time: 10 minutes

Breakthrough pain dose
- <50 kg: Dilaudid (Hydromorphone) 0.004mg/kg IV q2h prn moderate pain (4-6)
- <50 kg: Dilaudid (Hydromorphone) 0.008mg/kg IV q2h prn severe pain (7-10)
- 50 kg or >: Dilaudid (Hydromorphone) 0.2mg IV q2h prn moderate pain (4-6)
- 50 kg or >: Dilaudid (Hydromorphone) 0.4mg IV q2h prn severe pain (7-10)

Maximum hourly infusion: based on continuous and demand doses

Acetaminophen IV
- <50 kg: Acetaminophen 15 mg/kg IV q6h for 3 doses
- 50 kg or >: 1,000 mg IV q6h for 3 doses

Post Operative Spinal Fusion Timeline

POD 1-2:
- *CAUTION: NO acetaminophen prn order if taking oral opioids containing acetaminophen
- *When tolerating feeds, start oral/feeding tube pain medication
- *After tolerating initial pain medication dose, taper PCA Continuous until discontinued
- *With surgeon approval, start Toradol IV q6h x 48 hours
- *Start Diazepam alternating with oral opioid, (ie. Norco, Lortab, or Percocet)
- *Optional: Neurontin at surgeon’s discretion

POD 3:
- *Continue transition off IV pain medication
- *Evaluate daily to transition from around the clock oral pain medicine to prn dosing

POD 4-5:
- *Monitor response to being off IV pain meds x 24 h
Spinal Fusion for Neuromuscular Scoliosis
Care Guideline

Enteral Protocol for Post Operative Spinal Fusion (if Enterally fed)

- **Continuous Feedings:**
  - Initiate home formula or formulary therapeutic substitution at full strength running at 25% of usual/goal rate.
  - Check residuals every 4 hours.
    - Maintain current rate or advance to next step in protocol for residuals ≤200% of the hourly rate.
    - Contact physician for residuals >200% of hourly rate
  - Increase to 50% of usual/goal rate after 8 hours.
  - Increase to 75% of usual/goal rate after 8 hours.
  - Increase to 100% of usual/goal rate after 8 hours.

- **Intermittent/Bolus Feedings:**
  - Initiate home formula or formulary therapeutic substitution at full strength at 25% of usual/goal bolus volume for 2 feedings.
  - Check residuals before each bolus.
    - Maintain current bolus volume or advance to next step in protocol for residuals ≤75% of previous bolus.
    - Contact physician for residuals >75% of previous bolus volume.
  - Increase to 50% of usual/goal bolus volume for 2 feedings. Continue to check residuals.
  - Increase to 75% of usual/goal bolus volume for 2 feedings. Continue to check residuals.
  - Increase to 100% of usual/goal bolus volume. Continue to check residuals x 2 feedings to ensure tolerance.

**References:**


Spinal Fusion for Neuromuscular Scoliosis: Preoperative Considerations

This preoperative timeline may be used as a general guideline. It begins when the orthopaedic surgeon (in coordination with neurosurgery or other surgical specialists) determines a need for surgical intervention. Timing and selection of medical specialty consults and diagnostic studies vary, depending on severity of scoliosis, co-morbidities, and pt/family needs.

- **3-4 months before surgery**
  - Orthopaedics
    - Orthopaedic surgeon completes “Surgery Scheduling” worksheet ; details preoperative needs
    - “Patient Checklist” for spinal surgery given to pt/family
    - Tentative surgery date may be scheduled
    - CXR (& noninvasive venous study if non ambulatory status) ordered; other studies as indicated
  - Gastroenterology Consult, if indicated
    - Assess nutritional status
    - Review bowel cleansing protocol
    - Determine readiness for surgery
- **2-3 months before surgery**
  - Pulmonary Consult
    - Respiratory provides Spirometry (FVC/FEV1) as patient able
    - Respiratory performs preoperative cardiopulmonary assessment to evaluate need for non-invasive mask desensitization
    - CXR and/or other studies as indicated
    - Determine readiness for surgery
  - Neurology Consult, if indicated (i.e. seizure disorder)
    - Evaluate seizure medications
    - Determine readiness for surgery
  - Cardiology Consult, if indicated
    - EKG, Echocardiogram, other studies as indicated
    - Determine readiness for surgery
  - Dental Consult, if indicated
- **1 month before surgery**
  - Orthopaedic surgeon/NP reviews preoperative medical specialty consults; may adjust care plan and surgery schedule accordingly
- **1 to 2 weeks before surgery**
  - Orthopaedics
    - Preoperative visit with primary orthopedic surgeon
    - H+P; review home medications (adjust if needed); document height, weight, allergies
    - Pt/Family Education from Orthopedic Nurse/Case Manager
      - Review/distribute “Scoliosis Packet” from Schoolhouse, refer to Scoliosis videos
      - Provide Hibiclens and CHG bath cloth to pt/family with instructions for use
      - Review postoperative plan regarding pain management, dietary, respiratory, bowel management program, mobility/equipment, infection prevention, and home needs
    - Pt obtains prescribed lab work and diagnostic studies
- **3 days and 2 days before surgery**
  - Bathe with Hibiclens
- **1 day before surgery**
  - Cleanse with CHG bath cloth (completed by IP RN if patient admitted day before surgery and by parent/caregiver at home if pt scheduled for admit on day of surgery)
  - SSU staff calls Pt/family to assess readiness, answer questions (if pt is scheduled for admit day of surgery)
- **Morning of surgery**
  - Initiate Order Set minimum of two (2) hours before scheduled surgery time
  - Cleanse with CHG; should be done within 6 hours prior to surgery
  - Obtain lab tests/diagnostic studies/reports (i.e. u/a w/ pregnancy test, urine C+S), if not previously obtained
  - Anesthesiology assesses patient needs
  - Verify and order home medications
  - NPO per surgery protocol
  - Preoperative unit sends prophylactic antibiotic (s) to OR with pt (starts Vancomycin if being given)
Spinal Fusion for Neuromuscular Scoliosis: Special Preoperative Considerations

- Spinal surgery in patients with neuromuscular disorders requires a multidisciplinary approach, with careful planning and specialized preoperative and postoperative care.

- The use of an orthopaedic coordinator, case manager, and/or patient admitting coordinator may facilitate the coordination of specialty referrals and communication between consultants and the surgical team.

- Preoperative surgical site infection prevention practices include surgical site infection prevention education for patient and family, CHG skin prep, timely and appropriate antibiotic prophylaxis, and use of clippers or no hair removal.

- Patient and Family Education resources include CHOC Children’s Video Series: “Scoliosis Surgery”, a “Scoliosis Packet” located on Schoolhouse, and SSI Prevention materials.

- CHG Technique is described in “Pre-operative Bath with Chlorhexidine Gluconate (CHG) Cloths (For Spinal Fusion Patients)”.

- Per CHOC Children’s “Antibiotic Prophylaxis for Surgery Guideline”, antibiotic prophylaxis for surgery is given within one hour prior to surgical incision, except for Vancomycin, which is given within two hours (from 60 -120 minutes) before the incision.

Resource List

- Antibiotic Prophylaxis
  - CHOC Children’s “Antibiotic Prophylaxis for Surgery Guideline”
    - Pathway: PAWS; Resources; Care Guidelines

- Patient and Family Education Resources
  - CHOC Children’s Video Series; “Scoliosis Surgery”
    - Pathway: CHOC.org; Our Institutes; Orthopaedics; Related Links; Video; Video Library
  - “Scoliosis Packet”
    - Pathway: PAWS; Resources; Schoolhouse; Patient and Family Education; Scoliosis Packet
    - http://paws/schoolhouse/subcategory.cfm?subcategory=Scoliosis
  - Surgical Site Infection (SSI) Prevention
    - Pathway: PAWS; Resources; Infection Prevention; Surgical Site Infections
    - http://paws/formbank/acct_diff2.cfm?subcategory=SSI

- Infection Prevention; Pre-operative CHG Bath
  - Manual: Infection Prevention; Section: General Infection Prevention; Number: 340; Title: “Pre-operative CHG Bath.
    - Attachment A. “Pre-operative Bath with Chlorhexidine Gluconate (CHG) Cloths (For Spinal Fusion Patients)”
    - Pathway: PAWS; Resources; CHOC POI; Infection Prevention

- Medication Reconciliation
  - Manual: Administrative and Patient Care; Section: Medication; Number: I-990; Title: “Medication Reconciliation”
    - Pathway: PAWS; Resources; CHOC POI; Administrative and Patient Care