LOW-RISK SPINAL FUSION

PRE-HOSPITAL MANAGEMENT

- Assessment
  - Evaluate learning needs, psychosocial assessment, nutrition assessment, and sleep assessment
- Education
  - Patients 11 years and older attend pre-op spine class, patients younger than 11 years receive 1:1 teaching
- Pre-operative skin care (at home) the night before surgery
  - Shower, dry off, use 1 packet of 2% chlorhexidine gluconate cloths to wipe entire back, air dry, clean pajamas

PRE-OPERATIVE MANAGEMENT

- Assessment | Radiographs
  - PA and lateral standing radiographs in EOS prior to surgery with spine-bending films as clinically indicated
- Assessment | Laboratory
  - MRSA nasal culture, Urine Analysis (UA) as clinically indicated, Urine pregnancy test (females age 12 and older), type and screen, type and crossmatch
- Antibiotics and Pain Medications
  - See Table 2. Suggested Pre-operative Medications
  - See Algorithm for ‘Standard’ Surgical Prophylaxis Surgery Patients

POST-OPERATIVE MANAGEMENT

- Assessment | Monitoring
  - Vital signs and neurovascular assessment every 4 hours for the first 24 hours, then every 8 hours until discharge.
  - Continuous pulse oximetry if patient requires oxygen or is on patient-controlled analgesia
  - Record output from indwelling catheter every 4 hours for the first 24 hours, then every 8 hours until discontinued
- Medications
  - See Table 3. Suggested Post-operative Medication
  - See Algorithm for ‘Standard’ Surgical Prophylaxis Surgery Patients
- Activity
  - Day of surgery: logroll every 2 hours, elevate head of the bed, dangle edge of bed as tolerated
  - Post-op Day 1: logroll, up to chair, begin ambulation, parent of child assistance in activities
  - Post-op Day 2 to Discharge: Dress, get out of bed, ambulate in room and hallway, walk up and down stairs
- Treatments
  - Incentive spirometry, cold therapy, and SCD stockings

DISCHARGE CRITERIA

- The following criteria must be met:
  - Off oxygen as clinically indicated, tolerate oral intake, voiding, pain well controlled with orals meds, cleared by PT, outer dressing removed, receive and understand discharge instructions
TARGET POPULATION

Inclusion Criteria

- Patients 8 to 21 years of age with idiopathic or congenital scoliosis, kyphosis, or spondyloysis without complex chronic conditions

Exclusion Criteria

- Patients less than 8 years of age
- High-risk spinal fusion patients

PRE-HOSPITAL MANAGEMENT

Assessment

- Evaluate the learning needs of the patient and caregivers prior to admission
  - Note: Evidence indicates a large portion of parents have limited literacy [Yin, 2009]. Parent health literacy may be linked to child health outcomes [Yin, 2009; DeWalt, 2009]
• Complete a psychosocial assessment prior to admission
  o Note: The psychosocial assessment should include evaluation of the family support system, plan for family post-surgery, school issues/concerns, guardianship, and resources
  o Nutrition assessment by registered dietician for patients with a body mass index (BMI) less than 10% for age or greater than 85% for age
  o Complete sleep assessment prior to surgery by asking the following four questions:
    • Does your child pause in their breathing at night?
    • Does your child struggle to take a breath at night?
    • Does your child feel sleepy during the day?
    • Does your child snore more than half of the night?

Education
• Patients over 11 years: should attend a pre-operative spine class
• Patients less than 11 years of age: should receive 1:1 pre-operative teaching
• Patients unable to attend a spine class: should receive 1:1 pre-operative teaching
  o Note: caregivers should receive education along with the patient
• It is suggested that patients and caregivers receive a tour of the hospital prior to surgery

Nutrition
• Encourage a well-balanced diet during the pre-operative period
  o Note: Adequate pre-operative nutrition has been associated with improved healing and decreased infection [Hatlen, 2010]
• Nil per os (NPO) guidelines according to anesthesia guidelines
  o Note: The American Society of Anesthesiologists recommends a minimum fasting period of six hours for solids and nonhuman milk/formula and a minimum of two hours fasting from clear liquids [Practice guidelines for pre-operative fasting, 2011]

Treatments
Preadmission pre-operative skin care
• Parents instructed not to shave or use depilatory on the patient’s back for at least a week prior to surgery
• No new tattoos or piercings in the 3 months prior to surgery date

Preadmission pre-operative skin care the night before surgery
• Patient to shower the night before surgery
• After drying off from the shower, patient to use one packet (= 2 cloths) of 2% chlorhexidine gluconate cloths to wipe their entire back; do not rinse with water; allow to air dry
• Put on clean pajamas

Pre-operative cleanse by pre-op nurse with 2% chlorhexidine gluconate (CHG) antiseptic cloth the morning of the surgery
• Use one packet (= 2 cloths) to wipe the entire back from top of shoulders to upper buttocks, including sides, completely wetting the skin; discard cloths
• Allow skin to completely air dry – do not rinse
• Note: The use of a 2% chlorhexidine gluconate-coated cloth or 4% CHG soap with a standardized, timed process before hospital admission is an effective infection prevention strategy for reducing the risk of post-operative surgical site infections (SSIs) [Edmiston, 2010]

**PRE-OPERATIVE MANAGEMENT**

**Assessment | Radiographs**

- Posterior/Anterior (PA) and lateral standing radiographs in standard EOS prior to surgery
  - Scoliosis patients: AP supine bending radiographs,
  - Kyphosis patients: AP lateral bolster radiographs of the thoracic spine
  - Other radiographs as clinically indicated
  - MRI as clinically indicated

**Assessment | Laboratory**

- **Nasal culture** for methicillin-resistant *Staphylococcus aureus* (MRSA) within 30 days prior to surgery
  - Note: Pre-operative testing and treatment of patients positive for MRSA has been shown to decrease the incidence of post-operative infections [Epstein, 2011]

- **Urine analysis** (UA) with microscopy obtained if clinically indicated

  Questions for verbal assessment for UA
  - Do you have a history of urinary tract infections (UTIs)? If yes, when was the most recent UTI?
    - **Answer:** NO – No UA is needed
    - **Answer:** YES – Clean catch UA and hold for culture if positive UTI in the past 3 months or has history of frequent (definition of ‘frequent’ based on clinical judgment) UTIs
  
  - Do you currently have any frequency, burning or foul-smelling urine?
    - **Answer:** NO – No UA is needed
    - **Answer:** YES – Clean catch UA and culture
      - **Note:** If UA is suggestive of UTI, a urine culture should be obtained and appropriate antibiotic coverage should be initiated
  
  - A ‘positive’ UA would include any of the following and should be sent for culture (per Dr. Nyquist)
    - Positive for white cells, greater than 0-5/hpf
    - Positive for red cells, greater than 0-3/hpf
    - Positive for nitrates
    - Positive for leukocytes
      - **Note:** Pre-operative bacteriuria may increase post-operative complications [Hatlen, 2010]

- **Urine pregnancy test** for all females 12 years and older and/or postmenarchal
- **Day of pre-op visit: HCT and Type and screen** to determine if antigens are present
- **Type and crossmatch on day of surgery**

**Assessment | Other Tests**

- Pulmonary function tests (PFTs) for patients with a thoracic scoliosis curve greater than 70°, kyphosis greater than 70°, any planned chest wall violation during surgery, or history of uncontrolled asthma
CLINICAL PATHWAY

Medications

- Please refer to Table 2. Suggested Medications for the Pre-operative Period and refer to the Orderset in Epic: Ortho IP Spinal Fusion Admission.

Antibiotics

- Please refer to Spine Surgery Patient Algorithm for "Standard" Surgical Prophylaxis for guidance on antibiotic ordering.

- Cefazolin 30 mg/kg (max of 2,000 mg) IV completion of antibiotic within 60 minutes of surgical incision. If patient is greater than or equal to 120 kg, dose is 3,000 mg. **AND**

- Vancomycin 15 mg/kg (max of 2,000 mg) IV completion of antibiotic within 60 minutes of incision for patients with a beta-lactam allergy, patients colonized or at high-risk for colonization with MRSA, patients over the age of 13, or post-menarchal, or with acne, or with signs of maturity such as pubic hair or breast buds.
  - For patients with documented hypersensitivity to vancomycin (Red Mans Syndrome), infuse over 120 minutes and pre-medicate with PO or IV diphenhydramine (see Table 2 for dosing).

- Alternative antibiotics for allergies:
  - Clindamycin 10 mg/kg (max of 900 mg) IV completion of antibiotic within 60 minutes of surgical incision for patients allergic to vancomycin.

- If patient is currently on antibiotics, consult Epi MD for recommended antibiotic prophylaxis.

Pain Medications

- For patients who can swallow pills, give acetaminophen tablet on arrival to the pre-op area
- For patients who can’t swallow pills, give acetaminophen oral solution, chewable tablets, or IV acetaminophen will be given in the OR

POST-OPERATIVE MANAGEMENT

Assessment | Monitoring

- Vital signs and neurovascular assessment every 4 hours for 24 hours, the every 8 hours until discharge.
- Continuous pulse oximetry if patient requires supplemental oxygen or is on patient-controlled analgesia
- Record output from indwelling catheter every 4 hours for the first 24 hours and then every 8 hours until discontinued
- Discontinue urinary catheter as soon as the patient can ambulate to the bathroom (post-op day 1 or 2)

Laboratory

- Hematocrit (HCT) every morning for the first three post-operative days unless:
  - If HCT greater than (>30 on post-operative day 1, discontinue
  - If HCT greater than (>27 on post-operative day 2, discontinue
- Decision to transfuse should be based on clinical symptoms and hematocrit
  - Persistent tachycardia not due to pain
  - Oxygen requirement despite aggressive pulmonary toilet
  - Symptoms of hypotension on standing

Medications

See Table 3. Suggested Medications for the Post-operative Period

Antibiotics
• Continue antibiotic prophylaxis for 24 hours post-operatively. Please refer to Spine Surgery Patient Algorithm for "Standard" Surgical Prophylaxis for guidance on antibiotic dosing.

Pain Medication – confirm with Anesthesia

• Patient-Controlled Analgesia (PCA) (Morphine or Dilaudid)
  o No basal rate should be ordered due to intrathecal morphine given in OR. Only demand those ordered.
  o Discontinue PCA after patient has tolerated 2 doses of oral pain medications on post-op day 1
  o See Patient-controlled Analgesia (PCA) Set-up, Administration, and Documentation

• Acetaminophen
  o Oral every 4 hours for 48 hours, then every 4 hours per PRN

• Oxycodone
  o Every 4 hours scheduled for 48 hours, then every 4 hours PRN
  o First post-op dose to begin first post-op day at 0900 ("Start PRN dose 4 hours after scheduled dose.")

• Ketorolac
  o Around the clock for 48 hours beginning 0900 on the first post-operative day, then ibuprofen PRN until discharge

• Diazepam
  o Every 6 hours as needed for spasms

Bowel Regimen

• Senna/Docusate twice a day
• Polyethylene glycol once a day
• Fleets enema PRN

Other Medications

• Nalbuphine
• Ondansetron
• Scopolamine, for patients 12 years of age and older
• Multivitamin

Activity

Day of surgery

• If morning surgery, dangle patient on side of the bed and/or stand and/or sit in the chair if the patient is able (standing and chair are optional based on clinical assessment)
• Logroll patient every 2 hours and as needed
• Elevate head of bed up to 90° (optional)

Post-operative Day 1

• Logroll patient every 2 hours and as needed
• Physical therapy (PT) twice daily
• Encourage and assist patient to sit on the edge of the bed, stand and to chair
• Begin ambulation
• Parent of child (POC) should be encouraged to participate in assisting with turning, ambulation, and activities of daily living, as well as with guided imagery, distraction and other forms of pain management
• Once cleared by PT, nursing or parent of child should assist patient with standing, sitting in chair, and ambulation at least 4 times per day until discharge

**Post-operative Day 2 to Discharge**
• Patient should dress in own clothing once the urinary catheter has been discontinued
• Assist patient up to chair and to ambulate in patient room and hallway at least 3-4 times per day
• Patient should be able to get out of bed with minimal family assistance
• Walk up and down stairs
• Patient must be able to climb stairs to pass PT
• After patient has been discharged from PT, patient and caregiver should be competent with independent transfers prior to discharge from hospital

**Nutrition**
• Idiopathic or otherwise healthy patients should only have clear liquids on the day of surgery
• Provide a light diet for breakfast on postoperative day 1 and then advance to regular diet as tolerated
• A well-balanced, high fiber diet with small frequent meals and increased caloric intake should be provided to encourage healing.

**Treatments**

**VTE prevention**
• Patients at risk for Venous Thromboembolism (VTE) receive prophylaxis in accordance with the VTE guideline

**Cold therapy**
• As needed to decrease pain
• Cold therapy is provided to patients for comfort and not necessarily to manage swelling or drainage
• If the patient does not tolerate cold therapy, it does not need to be used
• Family to take cold therapy unit home upon discharge

**Foley catheter**
• Discontinue when the patient is able to ambulate to the bathroom (post-op day 1 or day 2)

**Incentive spirometry (14cc/kg)**
• 10 times per hour while awake
• If not able to consistently achieve 14cc/kg on incentive spirometer, EZ pap treatments should be implemented per lung expansion protocol

**Dressing care**
• Reinforce dressings if saturated until first dressing change
• Dressing options (3)
  • MediHoney and Mepilex
    • First dressing change is day prior to or day of discharge (or sooner if soiled with feces or urine)
    • Keep the dressing clean and dry
    • Parents remove dressing 3 days after discharge
Prineo w/Mepilex and Tegaderm
- Remove mepilex and tegaderm before discharge
  - Do not replace mepilex prior to discharge
  - Leave prineo intact upon discharge
- Parents to remove Prineo 3 weeks after day of surgery

Zipline
- Remove medihoney and mepilex before discharge
- Do not replace mepilex prior to discharge.
- Caregiver may remove zipline 3 weeks after discharge by applying baby oil along the whole length of the zipline, which will allow for gentle separation from the skin. The zipline is allowed to get wet in the shower (no bathing) and can take up to 2-3 days to remove.

- Assess for clinical signs and symptoms of surgical site infection and, if present, report to surgical team
- Discharge teaching includes hand hygiene and dressing/wound care

**DISCHARGE CRITERIA**

Patient should not be discharged until the following criteria have been met:

- Off oxygen as clinically indicated
- Tolerating oral intake
- Voiding
- Bowel movement (BM) not required prior to discharge if NOT symptomatic (nausea, vomiting, distention)
- Pain well controlled with oral medications
- Cleared by PT
- Patient or caregiver can verbalize understanding of discharge teaching instruction

**FOLLOW-UP**

- Follow-up visits should occur at 4 to 8 weeks post-operatively and annually from the surgical date until discharged from care by the provider.
- Additional visit may be advised per provider discretion
ALGORITHM: ‘STANDARD’ SURGICAL PROPHYLAXIS FOR SURGERY PATIENTS

***CLINICAL PATHWAY***

**STANDARD INFECTION RISK PATIENT**

**SPINE SURGERY PATIENT ALGORITHM FOR “STANDARD” SURGICAL PROPHYLAXIS**

PRE-OP

- All Spine Surgery Patients having Implants
  - Exceptions: hardware removal

- 
  - age 13 years and/or
  - Post-neonatal and/or
  - known MRSA+

- MRSA + or unable to screen
  - Screen for MRSA (within 1 month of surgery date)

- MRSA -

- Vancomycin 15 mg/kg (max dose 2000 mg) for gram (+) MRSA / P. aeruginosa coverage
  - AND
  - Cefazolin 30 mg/kg (max dose 2000 mg; if greater than or equal to 120 kg, dose is 3000 mg) for gram (+) MSSA coverage.

- Cefazolin 30 mg/kg (max dose 2000 mg; if greater than or equal to 120 kg, dose is 3000 mg) for gram (+) MSSA coverage.

INCISION

INTRA-OP

- Intraoperative Redosing from start of Preop dose:
  - Vancomycin 15 mg/kg (max dose 2000 mg) every 8 hours
  - Cefazolin 30 mg/kg (max dose 2000 mg; if greater than or equal to 120 kg, dose is 3000 mg) every 4 hours

- For every 50% blood volume loss give half dose as below:
  - Vancomycin 7.5 mg/kg (max dose 1000 mg)
  - Cefazolin 15 mg/kg (max dose 1000 mg; if ≥ 120 kg, dose is 1500 mg)

- If within 30 minutes of next dose, give full dose.

POST-OP

- Vancomycin 15 mg/kg (max dose 2000 mg) every 8 hours × 3 doses
  - AND
  - Cefazolin 30 mg/kg (max dose 2000 mg; if greater than or equal to 120 kg, dose is 3000 mg)

- Cefazolin 30 mg/kg (max dose 2000 mg; if greater than or equal to 120 kg, dose is 3000 mg)
  - every 8 hours × 3 doses

- Discontinue All Antibiotics

Alternative Antibiotics for Allergies:
- If Cefazolin allergy = give Vancomycin
- If Vancomycin true allergy (not infusion reaction) = give Cefazolin + Clindamycin
- If allergy to Cefazolin + true allergy to Vancomycin = give Clindamycin

Antibiotic Dosing for Allergies:
- Clindamycin 10 mg/kg (max dose 900 mg); Preop dose started and completed within 120 min prior to incision

Antibiotic Intraop Redosing for Allergies:
- Clindamycin 10 mg/kg (max dose 900 mg)
  - Redosing every 6 hrs intraop from start of Preop dose
  - For 50% blood volume loss, give 50% of dose (15 mg/kg up to 456 mg)
  - If within 30 minutes of next dose, give full dose.

- If currently on antibiotics, consult Epi MD for recommended antibiotic prophylaxis

**When antibiotic redosing based on time requirement, blood volume loss needs to 0% for that specific antibiotic.**

**Applies to patients with normal renal and hepatic function. Otherwise consult Pharmacy.**

KP 3/1/2021
Table 1. Developmentally Normal Spine Fusion Care Path

<table>
<thead>
<tr>
<th>Time frame</th>
<th>Within 1-2 months of scheduled spine fusion</th>
<th>Pre-op/ Day of Surgery</th>
<th>Post-op/ Day of Surgery</th>
<th>Post-op: Day 1</th>
<th>Post-op: Day 2 and 3</th>
<th>Remaining Days to Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment/ Monitoring</td>
<td>Assess learning needs. Screen for sleep apnea. Screen med/surg and social history. Nutritional assessment.</td>
<td>H&amp;P and concents. Pre-op x-rays including benders and bolsters as ordered by provider. MRSA, type and screen (day of preop) . urine pregnancy test. type and crossmatch (day of surgery) PFTs if indicated.</td>
<td>Vitals, neurovascular checks, logroll q 4hrs. Foley. EMR every 4hrs x24. Pulse ox /CR monitor while on PCA or oxygen needed. Sedation score every 2hrs x24 hrs.</td>
<td>Vitals, neurovascular checks, logroll q 4hrs. Foley. EMR every 8hrs until discharge. Discontinue foley if able to ambulate to bathroom. Hematocrit every am x3 days. Reinforce dressing as needed.</td>
<td>Continue all applicable items from previous day. Discontinue foley if able to ambulate to bathroom.</td>
<td>Dressing options If mepilex/ medi honey/steri strips: change dressing day before or day of discharge. Use medi honey and mepilex. Leave on for 3 more days at home. If prineo: remove mepilex prior to discharge and then leave open to air and have family remove in 3 weeks. Zipline Remove medi honey and mepilex before discharge. Do not replace mepilex prior to discharge. Caregiver may remove zipline 3 weeks after discharge by applying baby oil along the whole length of the zipline, which will allow for gentle separation from the skin. The zipline is allowed to get wet in the shower (no bathing) and can take up to 2-3 days to remove.</td>
</tr>
<tr>
<td>Fluids/ Medications</td>
<td>NA</td>
<td>Preop medication for anxiety per anesthesia. Antibiotics per surgical prophylaxis algorithm. If vancomycin indicated give diphenhydramine and famotidine and acetaminophen as ordered for pain management.</td>
<td>MIVF, PCA as ordered. famotidine until tolerating oral medications. Diazepam as needed. Ondansetron and ketorolac as scheduled. Cefazolin or vancomycin 3 doses post-op. Gabapentin and acetaminophen as ordered.</td>
<td>PCA: transition to oral pain medications. Give oral pain med every 4hrs ATC as ordered. Discontinue PCA after patient has tolerated 2 doses of oral pain medications. Bisacodyl suppository as ordered. Senna-docustae po QD</td>
<td>IVF may cap PRN. Start ibuprofen when ketorolac discontinued. Oral pain meds prn after 48 hours Diazepam as needed</td>
<td>Oral every 4 to 6 hrs pm. Diazepam as needed.</td>
</tr>
<tr>
<td>Activity</td>
<td>Ad lib</td>
<td>Ad lib</td>
<td>Logroll every 2 hrs (even through the night). If am surgery dangle/ stand/ sit in chair as tolerated in the afternoon/ evening</td>
<td>Physical therapy (PT) to see patient twice a day until cleared. Dangle on edge of bed with PT. Up to chair, begin ambulating.</td>
<td>PT to assist with standing, sitting in chair, and ambulation. Encourage patient to dress when foley discontinued.</td>
<td>Nursing and parent of child to get patient up at least four times a day to ambulate. Patient and parent of child should practice and be competent with independent transfers.</td>
</tr>
<tr>
<td>Nutrition</td>
<td>Encourage well balanced diet</td>
<td>NPO per anesthesia guidelines</td>
<td>Clear liquids day of surgery</td>
<td>Light breakfast first post op day then advance as tolerated.</td>
<td>Advance as tolerated</td>
<td>Encourage well-balanced, high fiber diet with small frequent meals. Increase caloric intake for healing.</td>
</tr>
</tbody>
</table>
## Table 1. Developmentally Normal Spine Fusion Care Path continued

<table>
<thead>
<tr>
<th>Time frame</th>
<th>Within 1-2 months of scheduled spine fusion</th>
<th>Pre-op/Day of Surgery</th>
<th>Post-op/Day of Surgery</th>
<th>Post-op: Day 1</th>
<th>Post-op: Day 2 and 3</th>
<th>Remaining Days to Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatments</strong></td>
<td>NA</td>
<td>CHG wash night before surgery. SCD stockings VTE protocol. Respiratory – incentive spirometer (IS) 10x every hour while awake. Begin eZpap (if unable to do IS) 14ml/kg consistently per lung expansion protocol.</td>
<td>Oxygen to keep sats greater than 92%. Ice pack pm. SCD stockings per VTE protocol. Respiratory – incentive spirometer (IS) 10x every hour while awake. Begin eZpap (if unable to do IS) 14ml/kg consistently per lung expansion protocol.</td>
<td>Respiratory – incentive spirometer (IS) 10x every hour while awake. Begin eZpap (if unable to do IS) 14ml/kg consistently per lung expansion protocol.</td>
<td>Continue all applicable items from previous day</td>
<td>Continue all applicable items from previous day</td>
</tr>
<tr>
<td><strong>Teaching</strong></td>
<td>Pre-op spine class and hospital tour (can be done pre-op day if can’t attend class)</td>
<td>Meet with PA or resident to sign consent forms. Review teaching with Spine RN.</td>
<td>Plan of care. Orient to unit. Teach parent of child to fill cold therapy unit, have help with logroll</td>
<td>Pain control plan. Encourage further parent involvement in logrolling and ambulating. Distraction and guided imagery techniques. Have parent review handout ‘Guide to Postop Pain Management for Idiopathic Spine Patients’ and handouts under ‘Going Home’ tab in spine book</td>
<td>Begin discussing discharge plans. Encourage parent of child to problem solve for home. Have patient and parent of child try things independently with standby assist from RN/CA. Complete discharge check list in spine book</td>
<td>Review spine fusion discharge instruction handout, pain medications, and weaning constipation management, showering. Have parent of child take home cold therapy unit.</td>
</tr>
<tr>
<td>Medication</td>
<td>Indication</td>
<td>Dose</td>
<td>Frequency</td>
<td>Route</td>
<td>Maximum Dose</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------------</td>
<td>--------</td>
<td>-----------</td>
<td>-------</td>
<td>--------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>ANTIBIOTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefazolin</td>
<td>Pre-operative antibiotic prophylaxis for MSSA</td>
<td>30 mg/kg</td>
<td>ONCE</td>
<td>IV</td>
<td>2,000 mg</td>
<td>Complete infusion within 60 minutes before surgical incision</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>Pre-operative antibiotic prophylaxis for beta-</td>
<td>15 mg/kg</td>
<td>ONCE</td>
<td>IV</td>
<td>2,000 mg</td>
<td>Pre-op dose completed within 60 minutes of incision. Patients with documented Red Mans Syndrome should receive diphenhydramine pre-medication and 120 minute infusion of vancomycin</td>
</tr>
<tr>
<td></td>
<td>lactam allergy, MRSA positive, <em>P. acnes</em> coverage also for age &gt; 13 years and/or post-menarchal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clindamycin</td>
<td>Pre-operative antibiotic prophylaxis for patients allergic to vancomycin</td>
<td>10 mg/kg</td>
<td>ONCE</td>
<td>IV</td>
<td>900 mg</td>
<td>Complete infusion within 60 minutes of surgical incision</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>Vancomycin pre-medication for patients with documented Red Mans Syndrome</td>
<td>Tablets: 11-29.9 kg: 12.5 mg 30-50 kg: 25 mg &gt;50 kg: 50 mg</td>
<td>ONCE</td>
<td>PO</td>
<td>50 mg</td>
<td>For patients who cannot swallow pills give:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Diphenhydramine oral liquid 1 mg/kg (max dose 50 mg) OR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- IV diphenhydramine 1 mg/kg (max dose 50 mg)</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>Pre-operative pain medication</td>
<td>Tablets: 11-16 kg: 162.5 mg 16.1-21.5 kg: 250 mg 21.6-32.5 kg: 325 mg 32.6-43 kg: 500 mg &gt;43 kg: 650 mg</td>
<td>ONCE</td>
<td>PO</td>
<td>650 mg</td>
<td>For patients who cannot swallow pills give IV acetaminophen 15 mg/kg (max dose 650 mg)</td>
</tr>
</tbody>
</table>
### Table 3. Suggested Medications for the Post-operative Period continued

<table>
<thead>
<tr>
<th>Medication</th>
<th>Indication</th>
<th>Dose</th>
<th>Frequency</th>
<th>Route</th>
<th>Maximum Dose</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANTIBIOTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefazolin</td>
<td>Post-operative antibiotic prophylaxis for MSSA</td>
<td>30 mg/kg/dose</td>
<td>Every 8 hours x 24 hours post-op (3 doses)</td>
<td>IV</td>
<td>2,000 mg (if greater than or equal to 120 kg, dose is 3,000 mg)</td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>Post-operative antibiotic prophylaxis for beta-lactam allergy, MRSA positive, <em>P. acnes</em> coverage also for age &gt; 13 years and/or postmenarchal</td>
<td>15 mg/kg/dose</td>
<td>Every 8 hours x 24 hours post-op (3 doses)</td>
<td>IV</td>
<td>2,000 mg</td>
<td>Patients with documented Red Mans Syndrome should receive diphenhydramine pre-medication and 120 minute infusion of vancomycin</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>Post-operative antibiotic prophylaxis for patients allergic to vancomycin</td>
<td>10 mg/kg/dose</td>
<td>Every 8 hours x 24 hours post-op (3 doses)</td>
<td>IV</td>
<td>900 mg</td>
<td></td>
</tr>
<tr>
<td><strong>PAIN MEDICATIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>Mild pain</td>
<td>10-15 mg/kg/dose</td>
<td>Every 4 hours x 48 hours, then every 4 hours prn</td>
<td>Oral</td>
<td>650 mg</td>
<td>Tablet or suspension</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>Moderate to severe pain</td>
<td>0.1 to 0.15 mg/kg/dose</td>
<td>Every 4 hours x 48 hours, then every 4 hours prn</td>
<td>Oral</td>
<td>10 mg/dose</td>
<td>Start on post-op day 1 at 0900. Use conservative dosing for patients with OSA (start on the low end of the dosing range)</td>
</tr>
<tr>
<td>Ketorolac</td>
<td>• Post-operative, around-the-clock analgesia</td>
<td>0.5 mg/kg/dose</td>
<td>Every 6 hours x 48 hours, then ibuprofen every 6 hours prn pain</td>
<td>IV</td>
<td>30 mg/dose</td>
<td>Maximum duration: 48 hours. Start on post-op day 1 at 0900. Do not use in patients with underlying kidney disease</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>• Mild to moderate pain</td>
<td>10 mg/kg/dose</td>
<td>Every 6 hours prn</td>
<td>Oral</td>
<td>800 mg/dose</td>
<td>Start 6 hours after last ketorolac dose. Do not use in patients with underlying kidney disease</td>
</tr>
<tr>
<td>Diazepam</td>
<td>Muscle spasms</td>
<td>0.05 to 0.1 mg/kg/dose</td>
<td>Every 6 hours prn</td>
<td>Oral</td>
<td>4 mg/dose</td>
<td></td>
</tr>
<tr>
<td><strong>ANTIEMETICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ondansetron</strong></td>
<td>Post-operative nausea/vomiting (PONV)</td>
<td>0.1 mg/kg</td>
<td>Every 6 hours x 24 hours, then q6h prn</td>
<td>Oral or IV</td>
<td>4 mg/dose</td>
<td>May be given undiluted over 2 to 5 minutes when used as a single dose for prevention of PONV</td>
</tr>
<tr>
<td><strong>Scopolamine patch</strong></td>
<td>Post-operative nausea/vomiting (PONV)</td>
<td>1 patch</td>
<td>Every 72 hours</td>
<td>Transdermal</td>
<td>1 patch</td>
<td>For patients 12 years and older</td>
</tr>
</tbody>
</table>

**ACID BLOCKERS**

| **Famotidine** | Stress ulcer prophylaxis | <3 months: 0.5 mg/kg every 24 hours 3 months and older: 0.5 mg/kg every 12 hours | Start post-op day 1 | PO | 20 mg/dose |

**LAXATIVES**

| **Bisacodyl (Magic Bullet)** | Constipation | 2 to <12 years: 5 mg 12 years and older: 10 mg | Once daily | Rectally | 10 mg/dose | Start on post-op day 2 |
| **Fleets enema** | Constipation | 2 to <4 years: 33 mL 4 to <10 years: 66 mL 10 years and older: 133 mL | Once daily prn | Rectally | 2 to <4 years: 33 mL/dose 4 to <10 years: 66 mL/dose 10 years and older: 133 mL/dose | Start on post-op day 2 |
| **Senna-docusate (8.6-50mg/tablet)** | Constipation | 2 to <6 years: ½ tablet 6 to <12 years: 1 tablet 12 years and older: 2 tablets | Twice daily | Oral | 2 to <6 years: 1 tablet twice daily 6 to <12 years: 2 tablets twice daily 12 years and older: 4 tablets twice daily | Start on post-op day 1 |
| **Sennosides 8.8mg/5ml syrup** | Constipation | 2 to <6 years: 4.4 mg (2.5 mL) 6 to <12 years: 8.8 mg (5 mL) 12 years and older: 17.6 mg (10 mL) | Twice daily | Oral | 2 to <6 years: 6.6 mg (3.75 mL) twice daily 6 to <12 years: 13.2 (7.5 mL) mg twice daily 12 years and older: 26.4 mg (15 mL) twice daily | Start on post-op day 1 |
| **Polyethylene glycol 3350 oral powder** | Constipation | 0.5-1.5 g/kg/dose Standard dosing: 4.25 g, 8.5 g, 17 g | Once daily | Oral | 17 g | Start on post-op day 1 |

**CAREGIVER EDUCATION MATERIALS**

See the Spine Program book given to the patient at the pre-operative visit.
REFERENCES

Health Literacy

Pre-operative, Intra-operative, and post-operative measures
2. Practice guideline for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures: an updated report by the American Society of Anesthesiologists Committee on Standards and Practice Parameters. Anesthesiology 2011; 114:495-511.
Clinical pathways are intended for informational purposes only. They are current at the date of publication and are reviewed on a regular basis to align with the best available evidence. Some information and links may not be available to external viewers. External viewers are encouraged to consult other available sources if needed to confirm and supplement the content presented in the clinical pathways. Clinical pathways are not intended to take the place of a physician’s or other health care provider’s advice, and is not intended to diagnose, treat, cure or prevent any disease or other medical condition. The information should not be used in place of a visit, call, consultation or advice of a physician or other health care provider. Furthermore, the information is provided for use solely at your own risk. CHCO accepts no liability for the content, or for the consequences of any actions taken on the basis of the information provided. The information provided to you and the actions taken thereof are provided on an “as is” basis without any warranty of any kind, express or implied, from CHCO. CHCO declares no affiliation, sponsorship, nor any partnerships with any listed organization, or its respective directors, officers, employees, agents, contractors, affiliates, and representatives.
Discrimination is Against the Law. Children's Hospital Colorado complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex. Children's Hospital Colorado does not exclude people or treat them differently because of race, color, national origin, age, disability, or sex.

Children's Hospital Colorado provides free aids and services to people with disabilities to communicate effectively with us, such as: Qualified sign language interpreters, written information in other formats (large print, audio, accessible electronic formats, other formats). Children's Hospital Colorado provides free language services to people whose primary language is not English, such as: Qualified interpreters, information written in other languages.

If you need these services, contact the Medical Interpreter Department at 720-777-9800.

If you believe that Children's Hospital Colorado has failed to provide these services or discriminated in another way on the basis of race, color, national origin, age, disability, or sex, you can file a grievance with: Corporate Compliance Officer, 13123 E 10th Avenue, B450, Aurora, Colorado 80045, Phone: 720.777.1234, Fax: 720.777.7257, corporate compliance@childrenscolorado.org. You can file a grievance in person or by mail, fax, or email. If you need help filing a grievance, the Corporate Compliance Officer is available to help you.

You can also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights, electronically through the Office for Civil Rights Complaint Portal, available at cor.hhs.gov/ocr/office/file/index.html. You can also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights, at 500 West Summer Street, Room 334, HHH Building Washington, D.C. 20201 1-800-368-1019; 800-537-7394 (TDD). Compliant forms are available at www.hhs.gov/ocr/office/file/index.html.

Children’s Hospital Colorado complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex.

ATENCIÓN: si habla español, bene a su disposición servicios gratuitos de asistencia lingüística. Llame al 1-720-777-9800.


注意：如果您使用繁體中文，您可以免費獲得語言援助服務。請致電1-720-777-9800。

ВНИМАНИЕ: Если вы говорите на русском языке, то вам доступны бесплатные услуги перевода. Звоните 1-720-777-9800.

ачтунг: wenn sie deutsch sprechen, stehen Ihnen kostenfreie sprachliche hilfsdienstleistungen zur verfügung. rufnummer 1-720-777-9800.

注意事項：日本語を話される場合、無料の言語支援をご利用いただけます。1-720-777-9800 まで、お電話にてご連絡ください。