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
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Table 2. Suggested Medications for the Pre-Operative Period
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Parent | Caregiver Education

References

Clinical Improvement Team

TARGET POPULATION

Inclusion Criteria
  • Patients 8 to 21 years of age with idiopathic or congenital scoliosis, kyphosis, or spondylolysis 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
Medications
Obtain infectious disease recommendations for appropriate antibiotic coverage for patients that have received antibiotic treatment within the previous 90 days

Antibiotics
- See Table 2. Pre-operative Medications
- See Algorithm for ‘Standard’ Surgical Prophylaxis Surgery Patients
- Cefazolin 30 mg/kg IV completion of antibiotic within 60 minutes of surgical incision OR
- Vancomycin 15 mg/kg IV completion of antibiotic within 60 minutes of incision for patients with a beta-lactam allergy, patients in an institution with a high prevalence of MRSA or MRSE surgical site infections, 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
  - If vancomycin, pre-medicate with PO or IV ranitidine and diphenhydramine

Pain Medications
- For patients who can swallow pills, give gabapentin capsule or acetaminophen tablet on arrival to the pre-op area
- For patients who can’t swallow pills, give gabapentin oral solution or 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, then 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. Post-operative Medications
See Algorithm for ‘Standard’ Surgical Prophylaxis Surgery Patients
Antibiotics

- Continue antibiotic prophylaxis (cefazolin or vancomycin) for 3 doses post-operatively and discontinued by 24 hours post surgery
- See Algorithm for ‘Standard’ Surgical Prophylaxis Surgery Patients

Pain Medication – confirm with Anesthesia

- Patient-Controlled Analgesia (PCA) (Morphine or Dilaudid)
  - No basal rate should be ordered due to intrathecal morphine given in OR. Only demand those ordered.
  - Discontinue PCA after patient has tolerated 2 doses of oral pain medications on post-op day 1
  - See Patient-controlled Analgesia (PCA) Set-up, Administration, and Documentation
- Acetaminophen
  - Oral every 4 hours for 48 hours, then every 4 hours per PRN
- Oxycodone
  - Every 4 hours scheduled for 48 hours, then every 4 hours PRN
  - First post-op dose to begin first post-op day at 0900 (“Start PRN dose 4 hours after scheduled dose.”)
- Gabapentin
  - Same dose as pre-op dose TID (three times a day) starting on the evening of the surgery day (2100) and continuing through until the evening of the second post-op day, for a total of 7 doses
- Ketorolac
  - Around the clock for 48 hours beginning 0900 on the first post-operative day, then ibuprofen PRN until discharge
- Diazepam
  - 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
- Ranitidine
- 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

**STANDARD INFECTION RISK PATIENT**

**SPINE SURGERY PATIENT ALGORITHM FOR "STANDARD" SURGICAL PROPHYLAXIS**

All Spine Surgery Patients having implants
Screen for MRSA (within 1 month of surgery date)

**MRSA + (positive)**

Vancomycin 15 mg/kg (max dose 1000 mg) for surgical prophylaxis (gram (+) coverage, also P. acnes coverage)

**MRSA - (negative)**

Yes ≥ age 13 years and/or postmenarcheal

No Cefazolin 25 mg/kg (max dose 2000 mg) for surgical prophylaxis (gram (+) coverage)

**INCISION**

Intraoperative redosing from start of initial infusion:
Vancomycin 15 mg/kg every 8 hours or 50% of dose with one half blood volume loss

**INTRA-OP**

Intraoperative Redosing from start of initial infusion:
Cefazolin 25 mg/kg every 4 hours or 50% of dose with one half blood volume loss

**POST-OP**

Vancomycin 15 mg/kg every 8 hrs x 3 doses

Cefazolin 25 mg/kg every 8 hrs x 3 doses

Discontinue All Antibiotics

**Antibiotic Dosing**:  
- Cefazolin 25 mg/kg (max dose 2000 mg)  
- Vancomycin 15 mg/kg (max dose 1000 mg) – Pre-op dose started within 120min, before incision and completed prior to incision  
- Clindamycin 10 mg/kg (max dose 900 mg) (redosing every 6 hrs or 50% of dose with one half blood volume loss)  

If prolonged antibiotics in the previous 3 months (IV and/or >2 days po) consult Epi MD for gram negative recommended surgical prophylaxis.  
* applies to patients with normal renal and hepatic function. Otherwise consult pharmacy.
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 consents. 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/medihoney/steri strips: change dressing day before or day of discharge. Use medihoney 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 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. 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 pre anesthesia. Antibiotics per surgical prophylaxis algorithm. If vancomycin indicated give diphenhydramine and ranitidine. Gabapentin and acetaminophen as ordered for pain management.</td>
<td>MIVF, PCA as ordered. Ranitidine 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 pm after 48 hours.Diazepam as needed</td>
<td>Orals 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>
</tbody>
</table>
### Table 2. Suggested Medications for the Pre-operative Period

<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>Cefazolin</td>
<td>Pre-operative antibiotic prophylaxis for MRSA -</td>
<td>25 mg/kg</td>
<td>ONCE</td>
<td>IV</td>
<td>2,000 mg</td>
<td>Complete infusion within 60 minutes of surgical incision</td>
</tr>
<tr>
<td></td>
<td>Intra-op redose every 4 hours or 50% of dose when replacing each one half blood volume loss</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>Pre-operative antibiotic prophylaxis for beta-lactam allergy, MRSA +, P. acnes coverage</td>
<td>15 mg/kg</td>
<td>ONCE</td>
<td>IV</td>
<td>1,000 mg</td>
<td>Complete infusion within 60 minutes of surgical incision</td>
</tr>
<tr>
<td></td>
<td>Intra-op redose every 8 hours or 50% of dose when replacing each one half blood volume loss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Also give ranitidine and diphenhydramine upon arrival to pre-op area</td>
</tr>
<tr>
<td>Ranitidine</td>
<td>Vancomycin pre-medication</td>
<td>30-34 kg: 75 mg</td>
<td>ONCE</td>
<td>PO</td>
<td>150 mg</td>
<td>For patients who cannot swallow pills give:</td>
</tr>
<tr>
<td></td>
<td>35-44 kg: 75 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• ranitidine oral syrup 2 mg/kg (max dose 150 mg)</td>
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<tr>
<td></td>
<td>45-50 kg: 75 mg</td>
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<td></td>
<td></td>
<td></td>
<td>• IV ranitidine 1 mg/kg (max dose 50 mg)</td>
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<td></td>
<td>51-60 kg: 150 mg</td>
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<td></td>
<td>&gt; 60 kg: 150 mg</td>
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<tr>
<td>Diphenhydramine</td>
<td>Vancomycin pre-medication</td>
<td>30-34 kg: 25 mg</td>
<td>ONCE</td>
<td>PO</td>
<td>50 mg</td>
<td>For patients who cannot swallow pills give:</td>
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<tr>
<td></td>
<td>35-44 kg: 25 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• diphenhydramine oral liquid 1 mg/kg (max dose 50 mg)</td>
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<td></td>
<td>45-50 kg: 25 mg</td>
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<td></td>
<td></td>
<td></td>
<td>• IV diphenhydramine 1 mg/kg (max dose 50 mg)</td>
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<td></td>
<td>51-60 kg: 50 mg</td>
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<tr>
<td></td>
<td>&gt; 60 kg: 50 mg</td>
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<tr>
<td>Gabapentin</td>
<td>Pre-operative pain medication</td>
<td>30-34 kg: 100 mg</td>
<td>ONCE</td>
<td>PO</td>
<td>300 mg</td>
<td>For patients who cannot swallow pills give gabapentin oral solution 5 mg/kg (max dose 300 mg)</td>
</tr>
<tr>
<td></td>
<td>35-44 kg: 200 mg</td>
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<td>45-50 kg: 200 mg</td>
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<td>51-60 kg: 200 mg</td>
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<td></td>
<td>&gt; 60 kg: 300 mg</td>
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<tr>
<td>Acetaminophen</td>
<td>Pre-operative pain medication</td>
<td>30-34 kg: 325 mg</td>
<td>ONCE</td>
<td>PO</td>
<td>650 mg</td>
<td>For patients who cannot swallow pills give:</td>
</tr>
<tr>
<td></td>
<td>35-44 kg: 500 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• acetaminophen oral solution 15 mg/kg (max dose 650 mg)</td>
</tr>
<tr>
<td></td>
<td>45-50 kg: 650 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• acetaminophen chewable tablet</td>
</tr>
<tr>
<td></td>
<td>51-60 kg: 650 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• IV acetaminophen 15 mg/kg (max dose 1,000 mg)</td>
</tr>
<tr>
<td></td>
<td>&gt; 60 kg: 650 mg</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>For neonatal dosing (preterm and term neonates) refer to online formulry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Suggested Medications for the Post-operative Period

<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>Acetaminophen (PO)</td>
<td>Mild pain</td>
<td>Per manufacturer's</td>
<td>Every 4 hours x 48 hours, then</td>
<td>Oral</td>
<td>Per manufacturer's</td>
<td>For neonatal dosing (preterm and term neonates) refer to online formulary</td>
</tr>
<tr>
<td>(PR)</td>
<td>Mild pain</td>
<td>recommendations</td>
<td>every 4 hours pm for pain or</td>
<td></td>
<td>recommendations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patients on NPO</td>
<td></td>
<td>fever</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(IV)</td>
<td>Mild pain</td>
<td>Per manufacturer’s</td>
<td>Every 4 hours x 48 hours, then</td>
<td>Rectal</td>
<td>Per manufacturer’s</td>
<td>For neonatal dosing (preterm and term neonates) refer to online formulary</td>
</tr>
<tr>
<td></td>
<td>Patients on NPO and active NPO order</td>
<td>recommendations</td>
<td>every 4 hours pm pain or fever</td>
<td></td>
<td>recommendations</td>
<td></td>
</tr>
<tr>
<td>Ketorolac</td>
<td>Post-operative around-the-clock analgesia</td>
<td>0.5 mg/kg</td>
<td>Every 6 hours x 48 hours, then</td>
<td>IV</td>
<td>Per manufacturer’s</td>
<td>Maximum duration: 48 hours</td>
</tr>
<tr>
<td></td>
<td>Patients on NPO</td>
<td></td>
<td>ibuprofen every 6 hours pm pain</td>
<td></td>
<td>recommendations</td>
<td></td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>Mild to moderate pain</td>
<td>Per manufacturer’s</td>
<td>Every 6 hours pm</td>
<td>Oral</td>
<td>Per manufacturer’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjunct for more severe pain</td>
<td>recommendations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxycodone</td>
<td>Moderate to severe pain</td>
<td>0.1 to 0.2 mg/kg</td>
<td>Every 4 hours x 48 hours, then</td>
<td>Oral</td>
<td>10 mg/dose and 0.2 mg/kg/dose</td>
<td>Start on post-op day 1 at 0900</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>every 4 hours pm pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diazepam</td>
<td>Muscle spasms</td>
<td>0.05 to 0.1 mg/kg</td>
<td>Every 6 hours pm spasms</td>
<td>Oral or IV</td>
<td>4 mg/dose and 0.2 mg/kg/dose</td>
<td>Use with caution in neonates and young infants</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>Post-operative antibiotic prophylaxis</td>
<td>30 mg/kg</td>
<td>Every 8 hours x 24 hours</td>
<td>IV</td>
<td>2,000 mg</td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>Post-operative antibiotic prophylaxis</td>
<td>15 mg/kg</td>
<td>Every 8 hours x 24 hours</td>
<td>IV</td>
<td>1,000 mg</td>
<td>Pre-medication to prevent Redman’s Syndrome: Diphenhydramine 1 mg/kg IV every 8 hours x 24 hours (max dose 50 mg)</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>Post-operative antibiotic prophylaxis for</td>
<td>10 mg/kg</td>
<td>Every 8 hours x 24 hours</td>
<td>IV</td>
<td>900 mg</td>
<td></td>
</tr>
<tr>
<td>VANCYMYCIN ALLERGY</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Senna-docusate (8.6-50mg/ tablet)</td>
<td>Constipation</td>
<td>2-6 years: 0.5 tablet</td>
<td>Twice daily</td>
<td>Oral</td>
<td>4 tablets twice daily</td>
<td>Start on post-op day 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-12 years: 1 tablet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 12 years: 2 tablets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Docusate</td>
<td>Constipation</td>
<td>2-6 years: 50 mg</td>
<td>Twice daily</td>
<td>Oral</td>
<td>200 mg twice daily</td>
<td>Start on post-op day 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-12 years: 100mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sennosides Syrup 8.8mg/5ml or 8.8 mg tablet</td>
<td>Constipation</td>
<td>1-2 years: 4.4 mg</td>
<td>Twice daily</td>
<td>Oral</td>
<td>1-5 years: 8.8 mg twice daily</td>
<td>Start on post-op day 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-5 years: 8.8 mg</td>
<td></td>
<td></td>
<td>≥ 5 years: 17.6 mg twice daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-12 years: 17.6 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyethylene glycol 3350 oral powder</td>
<td>Constipation</td>
<td>0.2 to 1 g/kg</td>
<td>Once or twice daily</td>
<td>Oral</td>
<td>17 g</td>
<td>Start on post-op day 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard dosing: 4.25 g, 8.5 g, 17 g</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>


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

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisacodyl (Magic Bullet)</td>
<td>2-12 years: 5 mg 12 years: 10 mg 12 hours: 10 mg 12 hours: 10 mg 12 hours: 10 mg 12 hours: 10 mg</td>
</tr>
<tr>
<td>Fleet's enema</td>
<td>2-12 years: 66 ml 12 years: 133 ml 12 hours: 133 ml 12 hours: 133 ml 12 hours: 133 ml</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>Post-operative pain &lt; 30 kg: 5 mg/kg 30-34 kg: 100 mg 35-60 kg: 200 mg 60 kg: 300 mg</td>
</tr>
<tr>
<td>Nalbuphine</td>
<td>Opioid-related pruritus 0.05 mg/kg Every 3 hours pm itching IV 20 mg Maximum daily dose: 160 mg</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>Post-operative nausea/vomiting 0.1 mg/kg Every 8 hours pm vomiting Oral or IV 4 mg/dose or 0.15 mg/kg/dose Maximum daily dose: 16 mg/day</td>
</tr>
<tr>
<td>Scopolamine 1.5 mg patch</td>
<td>Post-operative nausea/vomiting 1 patch Every 72 hours Topical 1 patch Use only for patients &gt; 12 years</td>
</tr>
<tr>
<td>Rantidine</td>
<td>Stress ulcer prophylaxis 1 mg/kg Every 8 hours x 3 doses, then PO twice daily IV 50 mg/dose or 1 mg/kg/dose</td>
</tr>
<tr>
<td>Rantidine</td>
<td>Stress ulcer prophylaxis 2 mg/kg Twice daily Oral 150 mg OR 2 mg/kg/dose Start on post-op day 2 Maximum daily dose: 300 mg/day</td>
</tr>
<tr>
<td>Multivitamins</td>
<td>Multivitamin supplement Poly-vitamin-iron: 0.5-1 mL Centrum chewable-iron: 0.5 to 2 tablets Centrum adult: 1 tablet Daily Oral</td>
</tr>
</tbody>
</table>

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.

Gabapentin literature
3. Pandey, CK. Does preemptive use of gabapentin have no effect on postoperative pain and morphine consumption following lumbar laminectomy and discectomy. J Neurosurg Anesthesiol 2005. 17(3); 172.
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CLINICAL IMPROVEMENT TEAM MEMBERS

Sumeet Garg, MD | Orthopedic Surgery
Mindy Cohen, MD | Anesthesiology
Mark Erickson, MD | Orthopedic Surgery
Elise Benefield, RN | Clinical Nurse IV
Suzanne Evans, RN | Clinical Nurse IV
Rachel Lovria, PharmD | Clinical Pharmacist
Aimee Bernard, PhD | Clinical Care Guideline Coordinator

APPROVED BY

Clinical Care Guideline and Measures Review Committee – April 18, 2016
Pharmacy & Therapeutics Committee – March 3, 2016

<table>
<thead>
<tr>
<th>MANUAL/DEPARTMENT</th>
<th>Clinical Care Guidelines/Quality</th>
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<tr>
<td>ORIGINATION DATE</td>
<td>February 2, 2012</td>
</tr>
<tr>
<td>LAST DATE OF REVIEW OR REVISION</td>
<td>April 18, 2016</td>
</tr>
<tr>
<td>APPROVED BY</td>
<td>Lalit Bajaj, MD, MPH</td>
</tr>
<tr>
<td></td>
<td>Medical Director, Clinical Effectiveness</td>
</tr>
</tbody>
</table>

REVIEW/REVISION SCHEDULE

Scheduled for full review on April 18, 2020
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