SPINAL DEFORMITY SURGERY PATHWAY

EXECUTIVE SUMMARY

Physician Owner(s): Dr. Brian Hasley

Primary Objective

The purpose of this pathway is to optimize the efficiency, safety, and overall care for all patient undergoing spinal fusion at Children's Hospital and Medical Center. Also, to standardize pre-operative management of patients receiving spine fusion surgery by clarifying expectations for surgery based on anticipated level of complexity and reduce time from decision of surgery until surgery is performed. Lastly, to establish evidence-based clinical pathway also for antimicrobial surgical prophylaxis in low-risk patients undergoing major spinal surgery at Children's Hospital and Medical Center.

Spine Deformity Surgery Pathway, Low-Risk:

Inclusion Criteria (ALL bullets):

- Patients 8-21 years of age with one of the following diagnoses:
  - Idiopathic
  - Congenital scoliosis
  - Kyphosis
  - Spondylolysis/spondylolisthesis
  - Chronic diagnoses with **low risk** for cardiopulmonary or neurologic conditions such neurofibromatosis or cerebral palsy (GMFCS 1-2) may be included in this pathway.
- AND patient is undergoing a major spine surgery:
  - Posterior spine fusion
  - Anterior vertebral body tethering or anterior spinal fusion
  - Anterior and posterior spine fusion
  - Initial VEPTR placement
  - Initial growing rod placement

Exclusion Criteria:

- Vertical expandable prosthetic titanium rib (VEPTR) or growing rod expansion/adjustment.
- Spinal diagnosis related to trauma.
- Presence of complex chronic medical conditions or comorbidities
- Other criteria based on clinical judgment by Orthopedic Spine Surgery team.

Recommendations

Spine Deformity Surgery, Low-Risk

Timeline

- The goal is for surgery has the capacity to be scheduled within 2 weeks to prevent the progression of the spinal deformity.

Laboratory Evaluation

- MRSA nasal swab – A history of MRSA or positive MRSA swab may increase the risk of resistance of cefazolin and additional antibiotic coverage should be considered. Therefore, low risk spine fusion patients should be screened for MRSA by obtaining a clinical history of any prior MRSA infection and the MRSA nasal swab test. [1, 2]

Radiographic Evaluation

- Standing PA and Lateral, Supine AP left and right bending scoliosis radiographs (36" cassettes). Lenke classification is the primary classification system for surgical planning for treatment of patients with idiopathic scoliosis and is based on these four radiographs. [3, 4] 5]
- Supine traction, fulcrum bending, and push prone scoliosis radiographs may be considered additionally to assist with preoperative planning. [3, 6, 7]

Antibiotic Recommendations

- Refer to the Low-Risk Spine Deformity Surgery Antibiotic algorithm for specific recommendations.
- Cephalosporin antibiotics are a mainstay in antimicrobial surgical prophylaxis. An attempt should be made to include these antibiotics as first line agents in surgical prophylaxis. [8]
- Consistent with the established Perioperative Antimicrobial Guidelines and The Antibiogram Children's Hospital and Medical Center.
- Refer to the Penicillin allergy fact sheet if needed. Allergies to beta-lactam antibiotics (penicillin) are also commonly implicated medications in allergic reactions. Therefore, the patient/guardian/family need to be carefully questioned about the history regarding symptoms pertaining to the allergic reaction in question.
- Follow all SSI Prevention Bundle Elements:
    - Preoperative CHG Bathing (Pre-Operative Bathing)
    - Appropriate Skin Antisepsis and Hair Removal (Skin Preparation for Surgical Patients)
    - Normothermia (Preoperative Patient Temperature Management to Minimize Intraoperative and/or Postoperative Hypothermia) (Perioperative Comfort, Maintaining Normothermia)
    - Appropriate Antibiotic Timing (Surgical Antibiotic Prophylaxis)

Antibiotic	Dose	Frequency Intra-op	Frequency Post-op	Route	Maximum Dose	Time to Incision	Comments
Ceftazidime	50 mg/kg/dose	Every 4 hours	Every 6 hours	Intravenous	2000 mg	Within 60 minutes of incision	
Vancomycin	15 mg/kg/dose	Every 6 hours	Every 8 hours	Intravenous	1000 mg	Infusion started 60 to 120 minutes prior to incision	Infusion for 120 minutes with history of Vancomycin Flushing Syndrome Modify frequency with renal dysfunction – Contact pharmacy for recommendations.
Clindamycin	10 mg/kg/dose	Every 6 hours	Every 6 hours	Intravenous	900 mg	Within 60 minutes of incision	
Levofloxacin	10 mg/kg/dose	No re-dose	No re-dose	Intravenous	500 mg	Within 120 minutes of incision	Infusion to be run over 60 minutes
Gentamicin	2.5 mg/kg/dose	No re-dose	No re-dose	Intravenous	250 mg/kg	Within 60 minutes of incision	For renal dysfunction, contact pharmacy for recommendation.

Cefazolin	30 mg/kg/dose	Every 3 hours	Every 6 hours	Intravenous	<120kg – 2 g >120kg – 3 g	Within 60 minutes of incision	

Bacterial Decolonization Protocol

- Bacterial decolonization protocol is completed to reduce the risk of bacterial infection related to surgery. Therefore, it will be performed on all patients. [9-11]
- Chlorhexidine pre-surgical wash to reduce the risk of surgical site infections from skin contaminants. [12, 13]

Implementation Items

- Ortho Low risk Spine order set
- Ortho Complex Spine order set
- Bacterial decolonization protocol

Supporting Documents

- Pre-spinal fusion evaluation template
- My Spinal Fusion Guide (Education handout for patient)
- Spinal Fusion Preoperative check list

Rationale

The standardization of treatment has been shown to improve outcomes and decrease hospitalization time in patient with adolescent idiopathic scoliosis undergoing spinal fusion. [16, 17] The rationale for this pathway is to optimize patient care and satisfaction, and is as follows:

- Safety: Improved communication between providers (orthopedic surgeon, anesthesiology, hospitalists, and referrals) and standardized care coordination will optimize patient care leading to decreased complications and improved patient outcomes. [16, 17]
- Quality: Enhanced quality will be achieved by consistent approach to the management of patients leading to less variation in treatment.
- Cost: Will be reduced by decreasing hospital length of stay and the variation in treatment and the ability to tracking of consults and tests to determine their cost effectiveness.
- Workflow/Care Delivery: Improved care delivery will be achieved by basing clinical management on established guidelines and current evidence in the literature. Coordination of care will lead to better efficiency in care delivery and less delays.
- Patient/Family/Provider Satisfaction: Coordination of care through a dedicated nurse care coordinator will lead to improved patient/family satisfaction. This will be accomplished by better communication between providers and families, and enhanced efficiency through this pre-operative process.
- Downside Risks: A potential unintended consequent of the low-risk spine fusion pathway will be increase in tests and consults being performed. This erring on the side of caution to ensure patient safety for surgery may increase costs and delay care in the short term. However, the consistent approach and tracking over time will enable us to determine the long-term value and necessity of these tests.

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Metrics

1. Outcome
    a. Reduce the time from decision to perform surgery until surgical scheduling to 40 days respectively by March 2024
    b. Decrease length of stay (check-in to discharge) of patients to 2.5 days by March 2024
2. Process
    a. Reduce surgical start time delays to 25% by March 2024
3. Balancing
    a. Monitor readmission/ED visits within 30 days for any surgical-related reason
    b. Monitor PICU length of stay

Team Members

Champion: Brian Hasley, MD (Orthopedic Surgery)
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Stakeholders:

Clinical Effectiveness Medical Director: Bridget Norton, MD, MBA
Intensive Care Unit: Andrew MacFadyen, MD
Pharmacy & Antimicrobial Stewardship: Jen Zwiener PharmD
Infectious Disease: Andrea Green Hines, MD

Evidence

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