1.0 Introduction:

Purpose:

This pathway is developed by an interdisciplinary clinical team at SickKids using research, clinical experience and consensus agreement. It is a general guideline and does not represent a professional care standard governing providers’ obligations to patients. Care may be revised to meet individual patient needs.

At this time, due to limited published research evidence, all recommendations are considered Level C: Expert Opinion, except when noted otherwise.

Target Population:

- **Inclusion:**
  - Children aged 3 – 18 years old requiring surgery by an orthopaedic surgeon for a spinal deformity such as scoliosis or kyphosis. These deformities may be idiopathic, congenital or neuromuscular in nature or from a secondary cause such as Marfan’s.
  - Surgery will generally consist of surgical correction of the spinal deformity using metal implants which are attached to the spine, and then connected to a single rod or two rods. Implants are used to correct the spine and hold the spine in the corrected position until the spine segments which have been operated on are fused as one bone.
  - All patients will undergo Intraoperative neurophysiological monitoring (IONM) throughout the surgical procedure.
  - In some cases, a spinal orthosis (eg. Cheneau or Milwaukee Brace) may be required post-operatively for a specified time or for an ongoing basis.

- **Exclusion:**
  - Patients may be removed from this pathway if there are significant postoperative complications (eg wound infection, changes to spinal cord/neuromonitoring, difficulty with extubation).

Target Users:

- Surgeons, residents, fellows, nurses, physiotherapists, and orthotists.
2.0 Definitions

Definitions are from the Scoliosis Research Society www.srs.org, unless otherwise stated

- **Scoliosis** - a lateral curvature of the spine
- **Idiopathic Scoliosis** - defined radiographically as a lateral curvature of the spine greater than or equal to 10° Cobb with rotation or unknown etiology
- **Congenital Scoliosis** - scoliosis due to congenitally anomalous vertebral development
- **Neuromuscular Scoliosis** (NM) - a scoliosis due to either a neurologic or muscular disorder
- **Early Onset Scoliosis** - lateral (side to side) curve of the spine that is diagnosed at ages 0 - 9 years; includes infantile and juvenile idiopathic scoliosis and congenital scoliosis
- **Late Onset Scoliosis** - lateral (side to side) curve of the spine that is diagnosed at age greater or equal to 10 years
- **Kyphosis** - a posterior convex angulation of the spine
- **EOS 2D/3D imaging system** - digital radiography system that performs “uninterrupted full-body, weight bearing digital 2D and 3D imaging in a single scan with a low radiation dose” (National Institute for Health and Clinical Excellence, 2011, p.3)
- **Intraoperative Neurophysiological Monitoring (IONM)** is the use of physiological techniques 1) to assess neural integrity and/or 2) to map or neuro-navigate within at-risk neural structures during surgical procedures.
3.0 Clinical Practice Recommendations

Pre-Operative Management

Pre-operative Preparation
- Complete education about surgery and recovery phase
- Patient attends pre-operative teaching session completed by Ortho Clinic nurse
- Family to meet Ortho Nurse Practitioner on pre-op day
- Family to review About Kids Health information on spinal surgery

Pre-operative Medical Care and Tests
- Complete required pre-op tests on pre-op teaching day
- Discuss options for receiving blood intra and post-operatively with patient/family
- If indicated based on curve type and severity (determined at time of booking): complete echo, CT/MRI, Pulmonary Function Tests and any additional blood work
- Refer to dietician if patient is below 3rd percentile or BMI ≤ 10% to assist with weight gain prior to surgery to optimize pre-operative nutrition.
- Consult Thrombus team if patient has DVT/PE risk i.e. obesity, estrogen containing birth control, obesity, immobility, spinal cord injury
- Determine post-op bed placement with Anesthesia and note on surgical booking sheet (SA/OICU or PICU)
- Complete pre-op medical record

Post-operative Care
- Complete post-op order set

Blood work, CBC, Ferritin, Cross & Type
Focused Physical Exam: height & weight, musculoskeletal assessment if necessary to determine baseline
Spine X-rays EOS 3 ft PA & LATERAL™ (if possibly side benders)
Clinical photos (Pre-op & 6 months Post-op)
Pre-Anaesthesia Consult and ICU consult as indicated
Determination of Post-op bed placement including recommendations from pre-anesthesia clinic (ie children with co-morbid conditions, established on BIPAP, will require OICU/PICU bed post-op)
Patient/family advised of pre-op baths. Wipes to be used upon arrival. Refer to standard work document

- # of units of blood requested by the surgeon to be available intra-op will be based on type of scoliosis (idiopathic, congenital or neuromuscular), planned approach to surgery is anterior or posterior, and number of vertebral levels to be fused. (Grade A)
- Patient and family provided with contact information for SickKids Patient Blood Management Co-ordinator
- Patient should be prescribed a treatment dose of an iron supplement See e-formulary for dosing.

**Radiographs of the entire thoracic and lumbar spine and the iliac crests should be taken with patients standing erect with elbows fully flexed and relaxed fists on clavicles (fists-on-clavicles position), and holding their breath. [Grade B] In general PA radiographs are more valid and reliable than lateral radiographs.

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Post-Operative Management

Refer to: Care Pathway
4.0 Implementation Plan

- Education and awareness building by Orthopaedic Surgery program (surgeons, NPs, Fellows, Nurse educator) at: resident/fellow orientation and nursing staff orientation.
- Surgeons to communicate any updates in practice to Divisional colleagues.

5.0 Evaluation Plan

- Ortho Spinal Surgery Post-op order set utilization
- Length of Stay
- Correlation between Length of Stay and order set utilization

6.0 References


**Guideline Group Membership:**

- Janet Ahier, Nurse Practitioner Paediatrics, 5A Ward – Orthopaedics
- Jeannette So, Evidence Analyst, Surgery
- Reinhard Zeller, MD
- Stephen Lewis, MD
- Fatma Rajwani, PT, Quality Management, Clinical Practice Guideline Coordinator

**Internal Reviewers:**

- Cristina Franco, RN, 5A Clinical Support Nurse
- Braden Fielding, RN 5A, Staff Nurse
- Sabrina Boodham, Pharmacist
- Catharine Bradley, Physiotherapy Practitioner, Orthopaedic Clinic

**External Reviewers:**

- Mike Dodds, Orthopaedic Surgeon, Dublin Ireland (former Sickkids Spine fellow)

**Attachments:**

- *Scoliosis CPG Daily Care Goals.pdf*
- *Ortho Spinal Surgery July 18.pdf*
- *pre_op care pathway July 20.pdf*