Intraoperative Spinal Instrumentation Prevention
Evidence-Informed Pathway

**Inclusion Criteria:**
- Patients undergoing spinal instrumentation for scoliosis

**Exclusion Criteria:**
- None

**Clinical Standards are developed for 80% of the patient population with a particular disease. Each practitioner must use his/her clinical judgment in the management of any specific patient.**
Critical Points of Evidence*

**Evidence Supports**

- Administer cefazolin at a dose of 30 mg/kg up to a maximum dose of 2 grams for patients under 120 kg, and 30 mg/kg up to a maximum dose of 3 grams for patients over 120 kg. Re-dose cefazolin every 4 hours times 2 doses, then every 8 hours (1-3) — Strong recommendation, very low quality evidence

- Irrigation of the surgical site with normal saline. (23-26)

- Use 1-2 grams of vancomycin powder sprinkled in the surgical wound prior to closure to prevent surgical site infection in children that weigh >25kg. (4-10) — Strong recommendation, very low quality evidence

- To provide coverage for gram negative pathogens for incontinent pediatric patients by administering gentamicin at a dosing of 2.5 mg/kg with a maximum dose of 120 mg. (2, 11-14) — Strong recommendation, very low quality evidence

- To use drains in pediatric patients undergoing spinal instrumentation surgery for scoliosis. (3, 15-17) — Strong recommendation, very low quality evidence

**Evidence Lacking/Inconclusive**

- Irrigation by hand compared to pulse irrigation to decrease surgical site infection. (13, 18-20) — Unable to make a recommendation

- Use a three-minute povidone-iodine soak decrease the risk of surgical site infection. (21-22) — Unable to make a recommendation

- To administer vancomycin as the prophylactic pre-incision antibiotic in patients with severe penicillin allergy (defined by anaphylaxis) or known cephalosporin allergy. — Consensus recommendation

*NOTE: The references cited represent the entire body of evidence reviewed to make each recommendation.

**Measures**

**Process**

- Timely prophylactic antibiotic administration
- Maintenance of normothermia
- Appropriate prophylactic antibiotic re-dosing

**Outcome**

- Mortality
- Morbidity
- Instrumented spine surgical site infections
- Length of stay
References


Clinical Standards Preparation
This clinical standard was prepared by the Evidence-Based Outcomes Center (EBOC) team in collaboration with content experts at Texas Children’s Hospital. Development of this clinical standard supports the TCH Quality and Patient Safety Program initiative to promote clinical standards and outcomes that build a culture of quality and safety within the organization.

Intraoperative Spinal Instrumentation Infection Prevention

Content Expert Team
Melissa Ard, RN, Clinical Data Specialist
Judith Campbell, MD, Infectious Disease
Joyce Enoch, RN, Director of System Accreditation
Darrell Hanson, MD, Orthopedic Surgery
Kenneth Kocab, RN, Outcomes and Impacts Service
Lucila Marquez, MD, Infectious Disease
Laura Monson, MD, Plastic Surgery
Debra Palazzi, MD, Infectious Disease
Nihar Patel, MD, Anesthesiology
Imelda Tjia, MD, Anesthesiology
Veronica Velez, RN, Surgery
Elaine Whaley, MSN, RN, Infection Control

EBOC Team
Sheesha Porter, MSN, RN, Evidence-Based Practice Specialist
Kristy Rialon, MD, Surgery Quality
Binita Patel, MD, Chief Medical Quality Officer

Additional EBOC Support
Andrea Jackson, MBA, RN, Evidence-Based Practice Specialist
Betsy Lewis, MSN, RN, CNL, Evidence-Based Practice Specialist
Anne Dykes, MSN, RN, Manager

No relevant financial or intellectual conflicts to report.

Development Process
This clinical standard was developed using the process outlined in the EBOC Manual. The literature appraisal documents the following steps:
1. Review Preparation
   - PICO questions established
   - Evidence search confirmed with content experts
2. Review of Existing External Guidelines
   - Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery, 2013
   - National Institute for Clinical Excellence, Surgical Site Infection: Prevention and Treatment of Surgical Site Infection, 2020
   - Children's Hospital of Philadelphia, Spine Deformity “Best Practice” Guidelines, 2013
   - Seattle Children's Spine Pathway, 2019
   - Children's Hospital Colorado, High-Risk Spinal Fusion Clinical Care Guideline, 2018
   - Children's Hospital of Orange County, Spinal Fusion for Adolescent Idiopathic Scoliosis Care Guideline, 2018
   - Cincinnati Children's Hospital, Spine Surgical Site Infection Prevention Protocol, 2014
3. Literature Review of Relevant Evidence
   - Searched: PubMed, Cochrane Collaboration, Google
4. Critically Analyze the Evidence
   - 2 meta-analyses, 6 randomized controlled trials, and 21 nonrandomized studies
5. Summarize the Evidence
   - Materials used in the development of the clinical standard, literature appraisal, and any order sets are maintained in an Intraoperative Spinal Instrumentation Infection evidence-informed review manual within EBOC.

Evaluating the Quality of the Evidence
Published clinical guidelines were evaluated for this review using the AGREE II criteria. The summary of these guidelines are included in the literature appraisal. AGREE II criteria evaluate Guideline Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity and Presentation, Applicability, and Editorial Independence using a 4-point Likert scale. The higher the score, the more comprehensive the guideline.

This clinical standard specifically summarizes the evidence in support of or against specific interventions and identifies where evidence is lacking/inconclusive. The following categories describe how research findings provide support for treatment interventions.

“Evidence Supports” provides evidence to support an intervention
“Evidence Against” provides evidence against an intervention.
“Evidence Lacking/Inconclusive” indicates there is insufficient evidence to support or refute an intervention and no conclusion can be drawn from the evidence.

The GRADE criteria were utilized to evaluate the body of evidence used to make practice recommendations. The table below defines how the quality of the evidence is rated and how a strong versus weak recommendation is established.

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Type of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRONG</td>
<td>Desirable effects clearly outweigh undesirable effects or vice versa</td>
</tr>
<tr>
<td>WEAK</td>
<td>Desirable effects closely balanced with undesirable effects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality</th>
<th>Type of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies</td>
</tr>
<tr>
<td>Moderate</td>
<td>Evidence from RCTs with important limitations (e.g., inconsistent results, methodological flaws, indirect evidence, or imprecise results) or unusually strong evidence from unbiased observational studies</td>
</tr>
<tr>
<td>Low</td>
<td>Evidence for at least 1 critical outcome from observational studies, RCTs with serious flaws or indirect evidence</td>
</tr>
<tr>
<td>Very Low</td>
<td>Evidence for at least 1 critical outcome from unsystematic clinical observations or very indirect evidence</td>
</tr>
</tbody>
</table>

Recommendations
Practice recommendations were directed by the existing evidence and consensus amongst the content experts. Patient and family preferences were included when possible. The Content Expert Team and EBOC team remain aware of the controversies in the diagnosis/management of children undergoing spinal instrumentation surgery for scoliosis. When evidence is lacking, options in care are provided in the clinical standard and the accompanying order sets (if applicable).

Approval Process
Clinical standards are reviewed and approved by hospital committees as deemed appropriate for its intended use. Clinical standards are reviewed as necessary within EBOC at Texas Children’s Hospital. Content Expert Teams are involved with every review and update.

Disclaimer
Practice recommendations are based upon the evidence available at the time the clinical standard was developed. Clinical standards (guidelines, summaries, or pathways) do not set out the standard of care and are not intended to be used to dictate a course of care. Each physician/practitioner must use his or her independent judgment in the management of any specific patient and is responsible, in consultation with the patient and/or the patient’s family, to make the ultimate judgment regarding care.

Version History

<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun 2016</td>
<td>Originally completed</td>
</tr>
<tr>
<td>Jan 2022</td>
<td>recommendation &amp; algorithm update</td>
</tr>
</tbody>
</table>