Surgical Site Infections in Pediatric Spinal Surgery Over a Decade of Serial and Iterative Efforts to Eradicate Infection

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Disclosures

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- **BOD:** POSNA, PSSG; SP3
Surgical site infections (SSI) are a serious complication of pediatric spine deformity surgery.

Despite a lot of effort, infection is still NOT A “NEVER EVENT”
Purpose

• To assess the effect of various quality improvement initiatives in reducing the incidence of SSI after Pediatric Spinal Surgery

• Hypothesis: Implementation of quality assurance programs for SSI will decrease SSI incidence when comparing pre- and post-implementation periods
2008: SSI in Pediatric Spine Surgery

This infection spike prompted an in-depth, interdisciplinary review of infection prevention protocol at our institution.
What We Did: New Protocol

• Added routine gram negative prophylaxis
• Fastidious detail to timing and dosing of antibiotics
  • Dilute Betadine Wash
  • Pulse Irrigation
• CHG Shower day before and day of sx

JPO 2013; Best Practice Guidelines for SSI Prevention in High Risk Patients
In the 12 months after initiating the new protocol, SSI dropped dramatically.
What Happened Since Then?

- Retrospective cohort study
- Single institution from January 1st 2006 - March 31st 2018
- Inclusion Criteria
  - Patients undergoing posterior spinal instrumentation and fusion instrumentation, lengthening, revision
  - <21 years old
### Patient Characteristics: N = 2,082 procedures; N = 1,200 patients

<table>
<thead>
<tr>
<th></th>
<th>Years</th>
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<tbody>
<tr>
<td>Age @ Surgery</td>
<td>12.1 +/-</td>
<td>4</td>
</tr>
<tr>
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</tr>
<tr>
<td>Male</td>
<td>41.2%</td>
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<tr>
<td>Female</td>
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<td>Etiology</td>
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<td>Syndromic</td>
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<td>Idiopathic and Others</td>
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<tr>
<td>Surgery Type</td>
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<td>Lengthening</td>
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<td>Revision</td>
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<td>Definitive Fusion</td>
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<td>Stapling</td>
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<tr>
<td>Removal</td>
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2012 - Local Vancomycin
2015 - CUSP and SPS

Comprehensive Unit Based Safety (CUSP) Program
• Discussion of observed factors in SSI
• Successes and failures of previous quality programs
• Meant to stimulate thought on how to innovate in reducing SSI incidence
• Team and communication building to prevent complications
• Implemented in Mid 2015

Solutions for Patient Safety (SPS) Program
• Inter-hospital standardization of anti-infection practices (5 main elements)
  • Preoperative bath
  • No razor (avoid skin irritation)
  • Appropriate antibiotic timing
  • Appropriate skin antisepsis
  • Appropriate antibiotic redosing
• Fully Implemented in Mid 2015
Decrease in SSI Noted After Each Initiative

- BPG
- Local Vancomycin
- SPS + CUSP
SSI by Etiology: Huge Majority of Infection in NMS

- **Congenital**
  - SPS + CUSP
  - Year and Quarter of Occurrence

- **Neuromuscular**
  - SPS + CUSP
  - Year and Quarter of Occurrence

- **Syndromic**
  - SPS + CUSP
  - Year and Quarter of Occurrence

- **Idiopathic and others**
  - SPS + CUSP
  - Year and Quarter of Occurrence
<table>
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<th>Category</th>
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<th>Post (%)</th>
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<td>0.0%</td>
</tr>
<tr>
<td>Idiopathic</td>
<td>0.9%</td>
<td>0.6%</td>
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</table>
But Effect Seems to Wane Over Time

Graph showing the incidence of SSI (%): BPG, Local Vancomycin, SPS + CUSP over time. The graph indicates a fluctuation in the incidence of SSI with a peak in 2008-2 for BPG, and a general waning effect over time, especially noticeable for Local Vancomycin and SPS + CUSP.
Hawthorne Effect

Just “Turn the Lights On”!
“Sunlight is the best disinfectant.”

-Louis Brandeis
Discussion

• Quality initiatives aimed at SSI reduction programs are associated with a decrease in the incidence of SSI

• The effect of the program appears to have an initial response yet program effect wanes over time.

• Possible causes
  1. Program adherence wanes?
  2. Higher Risk Patients?
Conclusions

• Most recent initiative produced modest, qualitative decreases in incidence of SSI
• Quality Assurance initiatives may have a “honeymoon” effect that wears off over time
• NMS Etiology continues to be one of the largest risk factors for SSI
• “Never Event” Remains Elusive
Thank You!

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