Reducing the Risk of SSIs: NSQIP as a pathway to Improving Patient Outcomes

Michael Roskos M.D.
Overview

• Introduction
• What is NSQIP
• How we use NSQIP
• Examples of NSQIP driving process improvement
Introductions

• I work at Mayo Health System La Crosse where I have the NSQIP surgical champion since 2013
• General Surgeon
• I oversee our NSQIP program for all surgical departments except podiatry and ophthalmology

• NSQIP Team: Surgical Case Reviewers, Quality Performance Analyst, Process Improvement, OR and Inpatient nursing leadership, Surgical Champion (as needed anesthesia and pharmacy) Administrative Leader and Medical Director
NSQIP

- National Surgical Quality Improvement Project
- American College of Surgeon (ACS) data uses standard definitions
- Reliable Data bank risk stratified by ACS
- Lots of variables collected
- Exceptional follow-up
- Benchmarked nation and the world
- Continuously collected data
- Reports received every 3 months
Downsides of NSQIP

• 1 in 5 cases

• Limited by collected variables

• Data is not the improvement i.e. somebody has to look at data and do something with it.

• Lag period (our most recent data July 2017—end covers previous year ending Dec 2016)

• Each quarterly report drops previous 3 months, i.e. may take a while for change to be reflected in reports. Alternative monitoring may be needed
Using NSQIP

• Introduce to the practice with formal presentation and regular SAR updates. (we chose not notify surgeons of each event)

• Never argue about the data—may constructively discuss what to do with the data

• Surgeons want to be better---simply seeing the data and reviewing particular situations is facilitating change (documentation to post op follow up to process improvement)
Introduction to Urology Department

Subspecialties 07/01/13 - 06/30/14

<table>
<thead>
<tr>
<th>Subspecialty</th>
<th>Hospital Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS Urology Morbidity</td>
<td>1.33</td>
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<tr>
<td>SS Urology Pneumonia</td>
<td>0.97</td>
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<tr>
<td>SS Urology Renal Failure</td>
<td>0.97</td>
</tr>
<tr>
<td>SS Urology UTI</td>
<td>2.03</td>
</tr>
<tr>
<td>SS Urology SSI</td>
<td>0.94</td>
</tr>
</tbody>
</table>

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Outlier and Decile Status

- SS Urology Morbidity: 9
- SS Urology Pneumonia: 4
- SS Urology Renal Failure: 4
- SS Urology UTI: 10
- SS Urology SSI: 4
NSQIP SAR Results Orthopedic Cases

4.4%
Now What??

• Department presentations “forced” me to understand the data. Problems became easier to identify

• Orthopedic surgeons said “WE HAVE TO FIX THIS”-----------------------------------WELL OK THEN

• Timely overlap with CAUTI initiative

• Power of data

• Importance of process improvement expert
Orthopedic UTIs-Importance of Process Improvement Expertise

- Data Story: All Cases $\rightarrow$ UTI $\rightarrow$ Ortho $\rightarrow$ TKA

- Problem: UTI’s are occurring in orthopedic patients undergoing total knee arthroplasty surgery. 22% of all UTIs in the time frame

- Countermeasures:
  - OR staff standard work: 2 person foley catheter insertion process
  - Ortho modified order sets to remove foley catheter insertion requirement for TKA pts
  - Initiated urinary retention protocol---hospital
0.5% Orthopedic UTI rate
Orthopedic THA

Targeted - Orthopedic 01/01/16 - 12/31/16

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<table>
<thead>
<tr>
<th>Hospital Odds Ratio</th>
<th>0.98</th>
<th>0.88</th>
<th>0.82</th>
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<th>0.99</th>
<th>0.98</th>
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<table>
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<tr>
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<th>0 / 73</th>
<th>0 / 73</th>
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<th>1 / 73</th>
<th>3 / 73</th>
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<tbody>
<tr>
<td>Number of Events / Total Cases</td>
<td>TOROHO THA Renal Failure</td>
<td>TOROHO THA UTI</td>
<td>TOROHO THA SSI</td>
<td>TOROHO THA Sepsis</td>
<td>TOROHO THA C diff Colitis</td>
<td>TOROHO THA ROR</td>
<td>TOROHO THA Readmission</td>
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</tbody>
</table>

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Orthopedic TKA
0% TKA UTI rate

Targeted - Orthopedic
07/01/15 - 06/30/16

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<table>
<thead>
<tr>
<th>Hospital Odds Ratios</th>
<th>0.98</th>
<th>0.79</th>
<th>1.32</th>
<th>1.15</th>
<th>0.89</th>
<th>0.88</th>
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<table>
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<tr>
<th>Outlier and Decile Status</th>
<th>4</th>
<th>1</th>
<th>9</th>
<th>9</th>
<th>4</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Events / Total Cases</td>
<td>0 / 159</td>
<td>0 / 159</td>
<td>2 / 159</td>
<td>1 / 159</td>
<td>1 / 159</td>
<td>3 / 159</td>
</tr>
</tbody>
</table>

- T ORTHO TKA Renal Failure
- T ORTHO TKA UTI
- T ORTHO TKA SSI
- T ORTHO TKA Sepsis
- T ORTHO TKA ROR
- T ORTHO TKA Readmission
Orthopedic TKA
1.2 % TKA UTI Rate
Keys to Success/Added benefits

- Focus Statements
- Process Improvement
- Surgeon have to “buy in” ideally they “own it”
- Standing weekly meeting
- EMR directed physician orders simplified implementation.

- Carry over to other surgeries and other departments general surgery decrease foley rate
- Real financial Implications ($3000/UTI) and CAUTI rate is nonexistent.
Move on to Colorectal SSIs

SSI by Surgery Specialty
16 of 47 (36%)
General Surg by Op Procedure

8 of 16

- Colectomy
- Lap Chol
- Hernia
- Mastectomy
- Excision Cyst
- Amputation
Initial Colorectal SSI rates
Almost 14 %
Drill down statement: SSIs are occurring in patients undergoing colorectal surgery with an increased BMI.
Colorectal SSI

• Focus statement guides the process
• Process improvement expert has been invaluable for us
• Pharmacy expertise and participation crucial

• 5 whys
• Implement changes
• “Winning” combination is multifactorial
• Solutions different for each institutions
Implemented Changes
1-2 year process

• Pre-op Chlorhexidine gluconate was initially changed from packets to bottles and now to a foam
• Bowel prep with oral antibiotics
• Correct antibiotics, timing and dosing and re-dosing
• Chlorhexidine gluconate prep
• Patient temperature/OR room temperature
• Closing tray
• Wound closure
• Wound care
We did it: From one of the worst to one of the best
Current colorectal data NSQIP
Not so fast ......
IPAC data June 2016-May 2017
4.6% SSI rate

- 2016
  - 10/3/16 – Intraabdominal
  - 11/23/16 – Superficial Incisional Primary

- 2017
  - 1/9/17 – Superficial Incisional Primary
  - 2/4/17 – Superficial Incisional Primary
  - 2/9/17 – Superficial Incisional Primary
Colorectal outcomes

- Patient improvement (SSI rate <5%)
- Financial savings ($2000-$14,000 per SSI)
- Impacts entire surgical practice
- Confidence builder: We can make a difference
- Trust that you have a voice that can be safely shared and work can get done: I can make a difference
- Voice of the Mayo Health System
- Continued monitoring is crucial
Putting it all together Neurosurgical SSI

- Our team was ready
- Start to finish months not years
- Built on what we learned from prior experience
- Dramatic results/improvements
Scope of problem
5.3% SSI rate
Overview of the Process

- Neurosurgical update
- Join forces with IPAC
- Giant kickoff-safe environment
- Review data and Focus statement WHY but not solutions
- “own it”
- Numerous “complex” improvements
- 3-4 Several “smaller” fixes
- Weekly standing meetings
- Follow up monitoring using IPAC and NSQIP data
SSIs are occurring neurosurgery patients undergoing elective lumbar-laminectomies staying in hospital one night.
The 5 why’s

• Asking “Why?” or “What caused this problem?”
• Quick identification of the root cause.
• Popularized by Toyota in 1970’s
Data collected at kick off meeting
Value time, knowledge and experience

<table>
<thead>
<tr>
<th></th>
<th>Why 1</th>
<th>Why 2</th>
<th>Why 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre Op Process</strong></td>
<td>No standardized antibiotic orders</td>
<td>difficult to determine patient MRSA status</td>
<td></td>
</tr>
<tr>
<td><strong>Pre Op Process</strong></td>
<td>Under dosing antibiotics-not based on weight, only one antibiotic</td>
<td>Current order sets weight based dosing ranges are non-uniform</td>
<td></td>
</tr>
<tr>
<td><strong>Pre Op Anesthesia</strong></td>
<td>Dexamethasone pre/op intra op</td>
<td>to reduce inflammation</td>
<td>to reduce post op n/v</td>
</tr>
<tr>
<td><strong>Patient</strong></td>
<td>Ability to do hibiclens shower pre op</td>
<td>patient unable to wash own back</td>
<td>bacteria left on skin</td>
</tr>
<tr>
<td><strong>Pre-Holding</strong></td>
<td>No meds in preholding-affects antibiotic timing</td>
<td>The antibiotics would be circulating by time incision made</td>
<td>Instruction on pre op antibiotic order for timeframe to start the antibiotic not followed ie 90 min pre op</td>
</tr>
<tr>
<td>Topic</td>
<td>Why 1</td>
<td>Why 2</td>
<td>Why 3</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Uncovered hair and arms</td>
<td>Leads to skin cells shedding onto sterile surfaces and instruments</td>
<td>Proceeding with surgery after break in technique leads to bacteria on surfaces and instruments</td>
<td>Bacteria on surfaces and instruments introduces bacteria into the wound</td>
</tr>
<tr>
<td>3AIR warmer in close proximity to incision site</td>
<td>Proper distance not known</td>
<td>Blows bacteria onto sterile surfaces and instruments</td>
<td>Proceeding with surgery after break in technique leads to bacteria on surfaces and instruments</td>
</tr>
<tr>
<td>Hand Hygiene</td>
<td>Lack of knowledge of scrub procedure/not communicated to the team</td>
<td>Procedure not posted</td>
<td>Ongoing education not occurring</td>
</tr>
<tr>
<td>Break in sterile technique</td>
<td>Staff don’t feel safe speaking up when break occurs (this happens approx 1/20 cases)</td>
<td>Proceeding with surgery after break in technique leads to bacteria on surfaces and instruments</td>
<td>Bacteria on surfaces and instruments introduces bacteria into the wound</td>
</tr>
</tbody>
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Implemented changes

**Pre Op**

- Revised order sets to reflect the weight based pre op antibiotics
- Cefazolin ≤120 kg 2 gm IV or >120 kg or BMI ≥40 3gm IV within 60 min. of incision.
- re-dose <80 kg 1 gm or ≥80 kg 2 gm every 3 hours.
- Vancomycin 20 mg/kg IV (max 2 gm) within 90 min. of incision.
- no re-dosing
- Clindamycin ≤80 kg 600 mg or >80 kg or BMI ≥40 900 mg IV within 60 min. of incision.
- re-dose with same dose every 3 hours.
- MRSA/MSSA screening on all neurosurgery patients
- Change pre op shower product to foam HCG with easier to understand patient education handout
Implemented changes

**Intra Op**

- Enforcement of the OR Dress Code
- Review Culture of Patient Safety emphasizing the importance of speaking up when breaks in sterility observed
- Limited OR room traffic during Neurosurgery cases
- Changed irrigation solution from an antibiotic solution to Normal Saline
- Removal and replacement of initial Metrx cannulated dilator with non-cannulated dilator for easier cleaning.
- Enforced current intra op product representative policies

**Post Op**

- Stopped discharging patients home on oral antibiotics
- 3rd Surgical Nursing staff reviewed and updated discharge education
NSQIP Monitoring DATA

Neurosurgery Surgical Site Infection Rate

- ACS NSQIP Benchmark = 1.6%
- Target = 1%

- Start Project Planning
- Project Kickoff
November 2016 – June 2017

258 cases reviewed

3 case met NHSN criteria for infection

- 2 Superficial
- 1 Deep Incisional Primary

3/258 = 1.2% Infection Rate
Summary

- Good data
- Share data
- Pick focus SSI and focus your efforts
- Front end planning/communication
- Big kickoff with 5 WHYS (0600-0800)
- Capitalize on the expertise without wasteful meeting time focusing on innovation/expertise
- Regular follow up/meetings with small core
- “own it” mentality and expect accountability
- Regular data monitoring
Future

- Carefully chose future projects
- Continued eye on SSI-THE WORK NEVER STOPS
- Review and share NSQIP and IPAC data
- Follow up on prior projects-share the successes
- Patient focus-QUALITY
- Financial component as directed by CMS penalties
The Needs of the Patient Come First - W.J. Mayo
Questions & Discussion