The Society for Vascular Surgery
Patient Safety Organization
Quality Update

FGVSG Regional Meeting
Karen Homa, PhD
SVS PSO Quality Director
October 24, 2013
SVS is a Patient Safety Organization (PSO)

Mission:

To improve patient safety and the quality of health care delivery by providing web-based collection, aggregation, and analysis of clinical data submitted in registry format for all patients undergoing specific vascular treatments.
Agenda

• Surgical Site Infection Update
• Review the One Page Report
Surgical Site Infection Project

- First national quality improvement initiative
  - Spring 2012
- **VQI workgroup:** Adam Beck, Jason Chiriano, Jack Cronenwett, Mark Davies, Alik Farber, Karen Homa, Jeff Kalish, Megan Tracci, Magdiel Trinidad, Mark Wyers
- Analyzed risk-factors associated with in-hospital SSI after infra-inguinal bypass procedures
SSI outcomes analysis

• 7,908 VQI procedures
  – 2003 to June 2012
• Univariate - Several variables associated with SSI
  • BMI: OR = 1.35
  • Skin prep: OR = 0.62 protective
    – chlorhexidine or chlorhexidine with alcohol (Chloraprep) versus Iodine
  • Tissue loss: OR = 1.38
  • Graft recipient (distal: below knee): OR = 1.3
  • Transfusion ≥ 3 units: OR = 2.7
Multivariate logistic regression model

- Ankle-Branchial Index <0.35 on procedure side was associated with higher odds of SSI (OR 1.5)
- Chlorhexidine or chlorhexidine with alcohol was associated with lower odds of SSI (thus protective; OR 0.5)
- Transfusion ≥ 3 units was associated with higher odds of SSI (OR 3.3)
- Surgery time longer than 220 minutes was associated with higher odds of SSI
  - 221 to 290 minutes OR 2.1
  - > 290 minutes OR 2.9
- Area under ROC curve = 0.707
Wound Infection Rate after Infra-Inguinal Bypass Procedure
Observed and Expected by Centers
4,081 patient procedures, January 2010 December 2012

Overall rate Wound Infection
VQI = 3.6%
AUC = 0.65

adjusted for: skin prep, ankle/brachial systolic pressure index, transfusion, length of procedure

Significantly higher than expected:
* p<0.05
** p<0.01
December 2012 – centers were sent an email to share results:

<table>
<thead>
<tr>
<th>COPI</th>
<th>VQI wound infection rate</th>
<th>SVS PSO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3.6%</td>
</tr>
<tr>
<td>Center Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your center's number of procedures</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Your center’s wound infection rate</td>
<td></td>
<td>28.6%</td>
</tr>
<tr>
<td>Your center’s wound infection expected rate</td>
<td></td>
<td>5.9%</td>
</tr>
<tr>
<td>Observed rate vs. Expected rate</td>
<td></td>
<td>Rates significantly different p&lt;0.01</td>
</tr>
</tbody>
</table>

**Predictors of wound infection**

**VQI Average**
- Chlorhexidine Skin Prep: 60%
- Transfusion ≥ 3 units: 5.8%
- Procedure time > 220 minutes: 50%

**Your Center**
- Improvement Opportunity

<table>
<thead>
<tr>
<th></th>
<th>Chlorhexidine Skin Prep</th>
<th>Transfusion ≥ 3 units</th>
<th>Procedure time &gt; 220 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher is better</td>
<td>57%</td>
<td>33%</td>
<td>71%</td>
</tr>
</tbody>
</table>

Significantly higher infection rate than expected. Switch to Chlorhexidine. Reduce number of transfusions.

Note: This patient safety work product generated within the SVS PSO, LLC, is considered privileged and confidential.
INFRA File

- As of 8.1.2013 there have been 12,855 INFRA procedures
  - 8,293 had skin prep
    - Chlorhexidine with or without alcohol
    - Iodine with or without alcohol
    - Exclude alcohol only, chlorhexidine & iodine, and all 3 (alcohol, chlorhexidine & iodine)
  - 7,545 had procedure > 2010
126 centers

Chorhexidine usage

COPI report emailed

Number of centers contributing data per week

10 to 57 centers contributing procedures per week: Not all centers join VQI at the same time
126 centers

G-chart: In-hospital SSI

On average 26 patients do not have infection then the next patient has SSI: \( \frac{1}{27} = 3.7\% \)

Many points above the UCL – the process is unstable (may have to do with combining 126 centers)
INFRA File

• As of 8.1.2013 there have been 12,855 INFRA procedures
  – 8,293 had skin prep
    • Chlorhexidine with or without alcohol
    • Iodine with or without alcohol
    • Exclude alcohol only, chlorhexidine & iodine, and all 3
  – 7545 had procedure > 2010
  – 4779 procedures at centers that had 10 or more procedures per year (2011, 2012, & 2013)
38 centers

Chorhexidine usage

COPI report emailed

Number of centers contributing data per week

9 to 30 centers contributing procedures per week: Not all centers join VQI at the same time
On average 28 patients do not have infection then the next patient has SSI: 1/29 = 3.4%
38 centers

- Classification of chlorhexidine usage
  - Rare: <10% = rare usage
    - 3 centers
  - Selective: Between 10% to < 80%
    - 12 centers
  - Routine: => 80%
    - 23 centers

2011 Chlorhexidine Usage

- Routine: 60%
- Selective: 32%
- Rare: 8%
38 centers: Chlorhexidine usage per year

- 23 centers routinely using chlorhexidine
- Some centers increased their usage of chlorhexidine
- Some centers usage of chlorhexidine remained the same
38 centers: Chlorhexidine usage per year

• Classification of chlorhexidine change of usage from 2011 to 2013
  • Increase usage
    – 11 centers
  • Same selective usage
    – 5 centers
  • Same routine usage
    – 22 centers
    – 1 center routine usage in 2011 moved to selective usage but difference in chlorhexidine usage between 2011 to 2013 was not significant (94% to 74%; Fisher exact test p > 0.05)
Classification of chlorhexidine change of usage from 2011 to 2013

- Increase usage
  - 11 centers
- Same selective usage
  - 5 centers
- Same routine usage
  - 22 centers
  - 1 center routine usage in 2011 moved to selective usage but difference in chlorhexidine usage between 2011 to 2013 was not significant (94% to 74%; Fisher exact test p > 0.05)

Examine the results from these 11 centers
11 centers: increased usage

Chorhexidine usage

- LCL 3 sigma
- Center Line
- UCL 3 sigma
- Proportion

COPI report emailed

All centers contributing procedures: 8 to 11 centers per month
11 centers: increased usage

G-chart: In-hospital SSI
11 centers increased usage of chlorhexidine from 2011 to 2013 with 10 or more procedures each year.

Increase in Chlorhexidine usage: 4.7%
COPI report emailed: 84 1.2%

All centers contributing procedures: 8 to 11 centers per month

Higher is better
38 centers: Chlorhexidine usage per year

- Classification of chlorhexidine change of usage from 2011 to 2013
  - Increase usage
    - 16% to 93% 11 centers
  - Same selective usage (46%)
    - 5 centers
  - Same routine usage (97%)
    - 22 centers
    - 1 center routine usage in 2011 moved to selective usage but difference in chlorhexidine usage between 2011 to 2013 was not significant (94% to 74%; Fisher exact test p > 0.05)

  No change in SSI
  - 3.3%

  Decrease in SSI
  - 4.7% to 1.2%
    - 3 centers reduced transfusions

  No change in SSI
  - 2.9%
Decrease in SSI from 4.7% to 1.2%

- 853 patients had 10 SSI (1.2%)
  - At the prior 4.7% rate there would have been 41 SSI
  - Prevented 31 SSI

- Depending on the severity of the SSI cost range from $400 to $30,000
  - Longer hospital stay, readmissions, clinic and ED visits, surgery, prolong antibiotic treatment, test, home visits
  - Lost work time, reduction in quality of life

Review the One Page Report
One page report in your Center Packet

• Your center’s rate on 4 quality initiatives
• Data in registry up to 7/31/2013
  – 9 month or greater Follow-up for 2011 Procedures
  – In-hospital SSI after Infra-inguinal Bypass
  – Discharge Medications
  – Smoking Cessation
9 month or greater Follow-up for 2011 Procedures
There are several outcomes variables in the registry that required one year follow-up. This data makes our registry valuable for research and to understand the value of procedures.
### 9 Month or Greater Follow-up

*2011 patient procedures with an office or phone follow-up*

Excludes patients with technical failure, conversion to open, amputation, and died < 9 month post-procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Your center</th>
<th>Your region</th>
<th>VQI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># procedures</td>
<td>% follow-up</td>
<td># procedures</td>
</tr>
<tr>
<td>CAS</td>
<td>41</td>
<td>51%</td>
<td></td>
</tr>
<tr>
<td>CEA</td>
<td>365</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>EVAR</td>
<td>162</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>HEMO</td>
<td>33</td>
<td>97%</td>
<td></td>
</tr>
<tr>
<td>INFRA</td>
<td>169</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>OAAA</td>
<td>59</td>
<td>73%</td>
<td></td>
</tr>
<tr>
<td>PVI</td>
<td>193</td>
<td>74%</td>
<td></td>
</tr>
<tr>
<td>SUPRA</td>
<td>78</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>TEVAR</td>
<td>70</td>
<td>74%</td>
<td></td>
</tr>
</tbody>
</table>
Goal 80%
Overall rate 64%
In-hospital SSI after Infra-inguinal Bypass
## Surgical Site Infection after Infra-Infra-Ingual Bypass

Centers with 10 or more procedures in 2012

<table>
<thead>
<tr>
<th>Skin Prep with Chlorhexidine with &amp; without Alcohol versus Iodine with &amp; without Alcohol</th>
<th>Surgical Site Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>Your center</td>
<td></td>
</tr>
<tr>
<td>Your region</td>
<td>77%</td>
</tr>
<tr>
<td>VQI</td>
<td>63%</td>
</tr>
</tbody>
</table>
Discharge Medications
## Discharge Medications
### 2012 & 2013 Procedures
Excludes missing, medical reason, and non-compliant

<table>
<thead>
<tr>
<th></th>
<th>% Antiplatelet &amp; Statin</th>
<th>% Antiplatelet only</th>
<th>% Statin only</th>
<th>% Neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your center</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your region</td>
<td>70%</td>
<td>22%</td>
<td>3.7%</td>
<td>4.5%</td>
</tr>
<tr>
<td>VQI</td>
<td>73%</td>
<td>19%</td>
<td>4.2%</td>
<td>4.3%</td>
</tr>
</tbody>
</table>
Centers with 7 or or more procedures
Smoking cessation
## Smoking Cessation
Latest Patient Procedure

<table>
<thead>
<tr>
<th></th>
<th>Number of Patients 2011-13</th>
<th>% Smokers</th>
<th>2011 Patients with 9 month follow-up: Smoked at procedure</th>
<th>% Smoking at follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your center</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your region</td>
<td>3117</td>
<td>35%</td>
<td>227</td>
<td>64%</td>
</tr>
<tr>
<td>VQI</td>
<td>56120</td>
<td>35%</td>
<td>2288</td>
<td>60%</td>
</tr>
</tbody>
</table>
Centers with 7 or more patients
Patients with 9 month follow-up and smoked at time of procedure: % smoke at follow-up