The Society for Vascular Surgery
Patient Safety Organization: Use of A Quality Registry for Practice Improvement

Georgia Vascular Society
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Disclosures

• No relevant disclosures
Vascular Quality Initiative®

Launched by Society for Vascular Surgery in 2011

• **Mission:** To improve the quality, safety, effectiveness and cost of vascular health care by collecting and exchanging information.

• **3 Components:**
  – National Registries in a **Patient Safety Organization**
  – Regional Quality Improvement Groups
    • Based on Vascular Study Group of New England, 2002
  – Web-based data collection - reporting system
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Patient Safety Organization (Patient Safety Act)

- Allows patient identified information to be collected for quality improvement without informed consent
- Protects work product (any comparative data) from discovery to encourage honest reporting
- Precludes comparative data to be used for physician disciplinary purposes or marketing
- Allows non-identifiable data to be published
  - Statistical de-identification of patient, provider, hospital
National Registries in a Patient Safety Organization

- Carotid disease
  - Endarterectomy and stenting
- Aortic disease
  - Open and endovascular abdominal aneurysm repair
  - Endovascular repair thoracic aorta
- Lower extremity arterial disease
  - Bypass, interventional procedures, amputation
- Medical Management (in development)
- Dialysis access
- Vena cava filters
- Varicose veins
Advantages of SVS PSO Registry Data

• Allows data from all patients to be included
  – Not biased by those who only give consent

• Much more detailed information than claims data
  – Pre-, intra-, and post-op variables (> 150 per procedure)

• **One year follow-up for key outcomes**
  – Completed in physician’s office

• All consecutive procedures – allows rate calculation
  – Audited against hospital and physician claims data

• Longer follow-up with matched Medicare Claims
  – Survival also from Social Security Death Index
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Growth of Participating Centers

420 Centers, >3200 Physicians
### Total Procedures Captured (as of 7/2/2017)

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral Vascular Intervention</td>
<td>89,830</td>
</tr>
<tr>
<td>Carotid Endarterectomy</td>
<td>65,692</td>
</tr>
<tr>
<td>Infra-Inguinal Bypass</td>
<td>29,775</td>
</tr>
<tr>
<td>Endovascular AAA Repair</td>
<td>26,243</td>
</tr>
<tr>
<td>Hemodialysis Access</td>
<td>24,473</td>
</tr>
<tr>
<td>Carotid Artery Stent</td>
<td>10,725</td>
</tr>
<tr>
<td>Supra-Inguinal Bypass</td>
<td>10,155</td>
</tr>
<tr>
<td>Open AAA Repair</td>
<td>8,101</td>
</tr>
<tr>
<td>Thoracic and Complex EVAR</td>
<td>6,018</td>
</tr>
<tr>
<td>IVC Filter</td>
<td>5,211</td>
</tr>
<tr>
<td>Lower Extremity Amputations</td>
<td>5,034</td>
</tr>
<tr>
<td>Varicose Vein</td>
<td>3,830</td>
</tr>
</tbody>
</table>

### VQI Total Procedure Volume

![Graph showing the trend of total procedure volume from Jan-14 to Mar-16](image)
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Big Data: 370,000 Procedures, 7,500 per Month

Hospital Types
- Community: 37%
- Academic: 32%
- Teaching Affiliate: 31%

420 Centers >3200 Physicians
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Physician-Driven, Multi-Specialty Patient Safety Organization

2500 Specialists
All Procedures

- Vascular Surgery: 47%
- Cardiology: 17%
- Radiology: 17%
- General Surgery: 4%
- Other: 5%
- Cardiac Surgery: 11%

1600 Specialists
Interventional Procedures

- Vascular Surgery: 38%
- Cardiology: 26%
- Radiology: 26%
- Other: 10%
How to Grow and Sustain a Self-Funded PSO

- Leverage “Big Data” from the national registry to power analyses of processes that lead to best outcomes.

- Promote physician practice change, ownership and connection to the PSO/registry by developing smaller, regional quality improvement groups.
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New England QI Group Model - 2002

• Semi-annual meetings of physicians, nurses, researchers and administrators
• Analyze variation in process and outcomes among regional centers
• Discuss potential causes for variation
• Develop quality improvement projects in areas where substantial variation exists
• Promote ownership, collaboration, and greater opportunity to translate data into practice change
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Network of 17 Regional Quality Groups

Semi-annual meetings, Review variation Regional quality improvement projects
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Southwestern vascular study group

12th Bi-annual SEVSG Meeting
Ritz-Carlton Hotel, GVS Sept. 8th, 2017
Regional Groups: Lessons Learned

• Comparative feedback stimulates practice change
  – Physicians are naturally competitive
  – We all want to improve our results
  – We all want to have the best results

• Most vascular patients should be on a statin pre-op
  – Record statin use
  – Feedback results to surgeons
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VSGNE Pre-op Statin Use 2004

Initial 25 Surgeons
Vascular Quality Initiative®

VSGNE Pre-op Statin Use 2007

Initial 25 Surgeons
Vascular Quality Initiative®

Pre-op Statin Use VSGNE 2003-2008

- Started QI Initiative
- Set QI Goal = 80%
- Developed Letters to PCPs

Percent

2003 2004 2005 2006 2007 2008
Comparative feedback stimulates practice change

Large dataset can answer important clinical questions

- Should I use protamine to reverse heparin during carotid endarterectomy?
  - Protamine reverses anticoagulant used during surgery, to promote clotting
  - Re-operation for bleeding: 1.7%
    - Concern about causing too much clotting: stroke, MI
  - Low frequency events cannot be studied in small series and randomized trials are unrealistic
VSGNE Surgeon Practice

4587 Total CEAs

Protamine

2087 (46%)

No Protamine

2500 (54%)

Stone et al, J Vasc Surg, 2010
Reoperation for Bleeding

- Stone et al, J Vasc Surg, 2010

Protamine

0.6%
N=14

No Protamine

1.7%
N=42

*P=0.001
Thrombotic Complications

*P=NS

- Stone et al, J Vasc Surg, 2010
Regional Groups: Lessons Learned

• Comparative feedback stimulates practice change
• Large dataset can answer important clinical questions
• Trusted analyses, reports can rapidly change practice
  – Physicians have ownership of regional group data
  – Protamine data were presented to regional group and published
VSGNE Protamine Use During CEA

Protamine use increased from 46% before 2009 to 61% after 2009 (P<.001).

Presented - Published Results in 2009
Regional Groups: Lessons Learned

- Comparative feedback stimulates practice change
- Large dataset can answer important clinical questions
- Trusted analyses, reports can rapidly change practice
- Changed practice can improve outcomes
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Protamine Use and Bleeding

Protamine Use

- Before 2009: 46%
- After 2009: 61%

P < .001

Re-operation for Bleeding

- Before 2009: 1.2%
- After 2009: 0.6%

P = .003

-Patel et al, J Vasc Surg 2013
Current QI Projects in VQI Regional Groups

- Increasing use of antiplatelet and statin use pre-op and at DC
- Decreasing myocardial infarction after arterial procedures
- Optimizing graft type choice for leg bypass
- Enhancing recovery after lower extremity amputation
- Reducing length of stay after VQI procedures
- Improving long term follow up of patients in VQI
- Reducing preventable causes of readmissions
- Preventing contrast-induced nephropathy after arteriography
- Increasing smoking cessation after major arterial procedures
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Improving Quality Across VQI Regions

• **COPI Reports**
  – **Center Opportunity Profile for Improvement**
• Analyze and report variation in outcome
• Multivariable model to define causes of outcome
• Individual report to each center:
  – How they compare with others for the outcome and each factor associated with the outcome
  – Provides a customized, actionable improvement plan for each center
• Significant variation found across VQI participating centers and regions

• Risk factors associated with SSI:
  – Operation > than 220 minutes
  – Transfusion > 2 units PRBC
  – Skin prep not chlorhexidine
### Vascular Quality Initiative®

**COPI Report for SSI after Lower Extremity Bypass**

<table>
<thead>
<tr>
<th>COPI</th>
<th>Your center’s number of procedures</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>VQI wound infection rate</td>
<td></td>
<td>3.8%</td>
</tr>
<tr>
<td>Your center’s wound infection rate</td>
<td></td>
<td>9.4%</td>
</tr>
<tr>
<td>Your center’s wound infection expected rate</td>
<td></td>
<td>4.6%</td>
</tr>
<tr>
<td>Observed rate vs. Expected rate</td>
<td></td>
<td>P&lt;.05</td>
</tr>
</tbody>
</table>

#### Predictors of wound infection

<table>
<thead>
<tr>
<th>VQI Average</th>
<th>Chlorhexidine</th>
<th>Transfusion &lt; 3 Units</th>
<th>Procedure time &lt; 220 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>79%</td>
<td>85%</td>
<td>50%</td>
</tr>
<tr>
<td>Higher is better</td>
<td>Higher is better</td>
<td>Higher is better</td>
<td>Improvement Opportunity</td>
</tr>
<tr>
<td>Your center</td>
<td>32%</td>
<td>60%</td>
<td>49%</td>
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Switch to Chlorhexidine. Reduce number of transfusions.
### COPI Report for SSI after Lower Extremity Bypass

#### Predictors of wound infection

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</table>

**Your Center**

- Improvement Opportunity
- Switch to Chlorhexidine. Reduce number of transfusions.
Chlorhexidine Skin Prep Use

Percentage

1/2/12  2/2/12  3/2/12  4/2/12  5/2/12  6/2/12  7/2/12  8/2/12  9/2/12  10/2/12  11/2/12  12/2/12  1/2/13  2/2/13  3/2/13  4/2/13  5/2/13  6/2/13  7/2/13  8/2/13  9/2/13  10/2/13  11/2/13  12/2/13

COPI Report

79%
93%
Centers with Most Improvement in Chlorhexidine Use

**Chlorhexidine Use**

- **2011:** 10%
- **2013:** 90%

**Infection Rate**

- **2011:** 5%
- **2013:** 1%

**Percentage**

- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100

**Year**

- 2011
- 2013

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Value of VQI Participation

• Does participation in VQI (receiving benchmark reports, attending regional meetings, etc.) improve patient outcomes?
Late Survival after Major Arterial Procedures

• 50,000 Patients in VQI who underwent
  – Leg bypass / intervention, oAAA / EVAR, CEA / CAS

• Evaluated pre-operative and discharge medications:
  – Antiplatelet agent (ASA, PY212 inhibitors)
  – Statins (HMG-CoA reductase inhibitors)

• Outcomes analyzed:
  – Effect on patient survival
  – Variation across centers
  – Impact of participation in VQI

Effect of Discharge Medications on Survival

- 81% Both
- 75% AP
- 68% Statin
- 55% None

26% Absolute improvement in 5-year survival when patients are discharged on AP & Statin

P<0.001 SE < 0.1

Variation in % Patients Discharged on Anti-platelet and Statin

VQI Mean = 76%

VQI Centers

Rate of Discharge Antiplatelet+Statin

30%

100%
Patients on Antiplatelet and Statin Pre-op and Discharge Based on Center Years Participation in VQI

Number of Years Participating in VQI

1 2 3 4 5 6 7

0% 10% 20% 30% 40% 50% 60% 70% 80%

58% 56% 58% 61% 65% 69% 70%
New VQI Initiatives

- Evaluating appropriateness of treatment
Appropriate Treatment

- Appropriate treatment requires not only good early and late outcomes, but also:
  - Correct patient selection
  - Correct procedure selection

- VQI provides an opportunity to analyze variation in patient and procedure selection
  - Feedback data to centers
  - Goal: regression toward the mean and reduced variation

- Current data show large variation!
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Carotid Artery Treatment by Stent (vs endarterectomy)

All VQI Centers Mean = 13% Stent Rx

Procedure Selection Variation

VQI Centers
Carotid Artery Treatment in Asymptomatic Patients

All VQI Centers Mean = 77% Asymptomatic

29% Asymptomatic

Patient Selection Variation

VQI Centers
Variation in Ultrasound Criteria for Severe Disease

Disease Severity Judged by Blood Flow Velocity in Narrowed Artery

- Median Velocity = 360 cm/sec
- Mean PSV (cm/sec)
  - PSV = 50 cm/sec: Less Severe Disease; More Procedures
  - PSV = 550 cm/sec: More Severe Disease; Fewer Procedures

Patient Selection Variation: Substantial Opportunity
Appropriate Treatment

• Challenges
  – Appropriateness is difficult to define
  – Controversies exist in many vascular procedures

• VQI provides an excellent platform for
  – Physician engagement
  – Dissemination of information
  – Following outcomes
Conclusions

- The VQI continues to grow and integrate into our specialty
- Regional groups promote physician ownership, trust
- Comparative data stimulates practice change
- Big Data provides new information
- COPI reports provide actionable, site specific opportunities for change that improves outcomes
- Variation in appropriateness can be measured and will hopefully lead to better patient, procedure selection
- PSO data can serve multiple stakeholders for optimal efficiency
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One Platform. One Data Set. Many Stakeholders.

SVS PSO

M2S

VQI Registry Stakeholders

Hospitals

Research Projects

FDA

CMS & Other Payers

NIH NINDS

Patients

Physicians

Device Companies

EHR Companies

Inter-National Registries

EHR Companies

Device Companies

Physicians

One Platform. One Data Set. Many Stakeholders.