Research Advisory Council Update:
Adam Beck, MD
National Research Process

http://www.vascularqualityinitiative.org/vqi-resource-library/quality-research/

Approved Project List – as of 12/13/2016

• To submit a proposal to be considered for the National RAC, please follow the link below and select “PSO National RAC – MONTH Proposal Submission.

http://abstracts123.com/svs1/meetinglogin
National Research Process

Proposal Submissions

**April 2017**
- Call for Proposals: February 14, 2017
- Due Date: Midnight March 27, 2017
- Meeting: April 10, 2017
- Notification Sent: April 11, 2017

**June 2017 – Dates Subject to Change**
- Call for Proposals: April 11, 2017
- Due Date: May 29, 2017
- Meeting: June 12, 2017
- Notifications Sent: June 13, 2017
Arterial Quality Council Update: Adam Beck, MD
Vascular Quality Initiative®

VQI Committee Activities – Arterial Quality Committee

The Arterial Quality Committee (AQC) discussed term limits and succession planning for VQI Registry Chairs and Vice Chairs and recommended:

- Three year terms renewable every year for one year
- The Vice Chair should be prepared to accept the Chair position when the Chair steps down
- The Chair can rejoin the committee after stepping down
- The AQC Chair has the right to ask a Chair or Vice Chair to step down if the Registry Chair or Vice Chair is unable to fully participate

Registry Chairs were requested to examine existing research projects to help identify two to three quality improvement projects that may lead to best practice recommendations for procedures included in each Registry.
Implementation of National QI Projects:

- **Three VQI committees** working on the National QI project rollout of improving discharge medication and EVAR LTFU imaging rates.
- Provide physician specific reports and COPI reports for discussion at regional meetings
- Identify high performing centers
- Seek industry funding for EVAR LTFU imaging once a plan of work has been completed.
- **Publication** of National QI projects in Feb 22nd issue of *Vascular Specialist*
PSO National QI Project Committee Process

SVS PSO
- Identify high performing centers
- Provide input to/from regional meetings
- Develop educational resources
- Develop COPI and Physician Reports
- Align with MIPS/MACRA
- Track successes

Arterial Quality Committee
- Goals, measures, definitions, benchmarks
- Analysis of results
- QI bundles (recommended clinical practices)
- Outcomes of interest to payers, administrators
- Recommended practices

Communications Committee
- Messaging to key stakeholders (providers, patients, administrators)
- Oversight of articles, press releases
- Physician and hospital engagement

Quality Improvement Workgroup
- QI implementation tools
- ‘How-To’ presentations
- Expert guidance for user groups
Implementation of National QI Projects:

Later Steps

• Planned VQI publication describing outcomes of patients with and without EVAR follow-up and imaging
• Registry changes: Automatic push reports that provide centers with information on patients needing follow-up imaging
• Incorporate QI project participation as part of the Participation Awards. Inform VQI members that adding QI project participation as part of the Awards program is being considered.
• Medicare integration/query to determine if imaging is being done elsewhere, but not entered in the VQI registry.
Discharge Medications: Reaching and Sustaining our Goal of 100%

Presented by:

Randall R. De Martino, MD, MS
Cheryl R. Jackson, DNP, MS, RN, CPHQ
Outline

- What do we mean by “Discharge Medications”?
- Why are they important?
- Medication use in VQI
- How to approach prescribing
- Tools for success
Discharge Medications

- A hospitalization is a “checkpoint” event
- Medication reconciliation
- Opportunity to ensure appropriate medical therapies are prescribed
**QI Webinar Series**

**Outpatient Setting**
- Patient with vascular disease in need of surgical procedure
- Emergent/Urgent
- Elective

**Inpatient Setting**
- Pre-operative evaluation
- Operative Procedure
- Discharge
- Follow Up

**Providers**
- Primary Care
- Cardiologists
- Radiologists

**Surgeon**

**Medication Prescribing by Surgeon**
- Less control of medications

**Opportunities**
- Medication assessment
- Peri-operative risk assessment

**Barriers**
- Unknown prior cardiovascular care
- Urgency
- Possible allergies

**Complete control over medications**
- Post Operative and Discharge Orders
- Medication reconciliation
- Initiate new medications
- Patient education

**Less control of medications**
- Reassess medication use
- Provider/Patient education
- Communication

**SVS | PSO**

**Patient Safety Organization**
What Meds are we talking about?

For today’s discussion we will focus on 2 medications:

- Antiplatelet medications
- Statins
Antiplatelet Medications

- Most commonly used is aspirin
- Widely available since 1899
- Available over the counter in several doses
- Other medications include clopidogrel (Plavix), prasugrel (Effient) and some others...
QI Webinar Series

Statins

- HMG-CoA reductase inhibitors
- Inhibit cholesterol synthesis in the liver
- Can profoundly reduce cholesterol levels
Recommendation for Statins

- Start Statins in all patients with
  - ACS
  - Prior MI
  - Angina
  - Stroke/TIA
  - Coronary revascularization
  - PAD

- If <75 yrs old – High intensity
- If >75 yrs old – moderate intensity

Recommendation for Statins

Patients with PAD should be initiated in a statin

Class 1A Recommendation
Start Antiplatelet medications in all patients with
- Cardiac disease
- Stroke/TIA
- PAD

Patients with PAD should be initiated on an AP medication

Class 1A Recommendation
Table 5. High-, Moderate-, and Low-Intensity Statin Therapy (Used in the RCTs Reviewed by the Expert Panel)*

<table>
<thead>
<tr>
<th>High-Intensity Statin Therapy</th>
<th>Moderate-Intensity Statin Therapy</th>
<th>Low-Intensity Statin Therapy</th>
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</thead>
<tbody>
<tr>
<td>Daily dose lowers LDL-C, on average, by approximately ≥50%</td>
<td>Daily dose lowers LDL-C, on average, by approximately 30% to &lt;50%</td>
<td>Daily dose lowers LDL-C, on average, by &lt;30%</td>
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<tr>
<td><strong>Atorvastatin (40†)–80 mg</strong></td>
<td><strong>Atorvastatin 10 (20) mg</strong></td>
<td><strong>Simvastatin 10 mg</strong></td>
</tr>
<tr>
<td><strong>Rosuvasstatin 20 (40) mg</strong></td>
<td><strong>Rosuvastatin (5) 10 mg</strong></td>
<td><strong>Pravastatin 10–20 mg</strong></td>
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<tr>
<td></td>
<td><strong>Simvastatin 20–40 mg‡</strong></td>
<td><strong>Lovastatin 20 mg</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Pravastatin 40 (80) mg</strong></td>
<td><strong>Fluvastatin 20–40 mg</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Lovastatin 40 mg</strong></td>
<td><strong>Pitavastatin 1 mg</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Fluvastatin XL 80 mg</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Fluvastatin 40 mg BID</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Pitavastatin 2–4 mg</strong></td>
<td></td>
</tr>
</tbody>
</table>
For patients with cardiovascular disease, both antiplatelets and statins are shown to reduce the risks of

- Heart attack
- Stroke
- Vascular death
Medication use in VQI

- Review of >14,000 patients in the VSGNE
- Reviewed patients undergoing:
  - CEA/CAS/AAA/LEB

Perioperative management with antiplatelet and statin medication is associated with reduced mortality following vascular surgery.
Preop and Discharge Medication Use

Proportion of patients on optimal medical therapy:

- 2005: 55%
- 2006: 59%
- 2007: 64%
- 2008: 68%
- 2009: 70%
- 2010: 67%
- 2011: 69%
- 2012: 66%

P trend <0.01
Preop and Discharge Medication Use

Proportion of patients on optimal medical therapy:

- **Carotid**
  - CAS: 78%
  - CEA: 74%

- **Bypass**
  - Infrainguinal: 60%
  - Suprainguinal: 57%

- **AAA**
  - oAAA: 57%
  - EVAR: 56%
Preop and Discharge Medication Use
Preop and Discharge Medication Use

Proportion of patients on optimal medical therapy

0% 25% 50% 75% 100%

40% 86%

Center

SVS | PSO
PATIENT SAFETY ORGANIZATION
Preop and Discharge Medication Use
Participation in the Vascular Quality Initiative is associated with improved perioperative medication use, which is associated with longer patient survival.

- Follow up study using national VQI data from all centers
- >28,000 first time cases performed across centers
AP and Statin Pre-Op and at Discharge

Percentage:
- Year 1: 58%
- Year 2: 55%
- Year 3: 58%
- Year 4: 61%
- Year 5: 65%
- Year 6: 69%
- Year 7: 70%
- Year 8: 66%
- Year 9: 68%
- Year 10: 68%
- Year 11: 70%
- Year 12: 73%

Number of years of VQI participation
Efforts to improve medication use have been underway in the VQI for about a year.

Targeted efforts were in:
- Push reports
- Education
Want to Improve 5-Year Survival? Check the Meds...

Antiplatelet (AP) and statin medications are an important component to treatment, but a third of eligible post-op VQI patients leave the hospital without these medications. Those patients on AP and statins had a 14% absolute survival benefit and 40% adjusted improved survival.

Survival by Discharge Medications

<table>
<thead>
<tr>
<th>No AP or statin</th>
<th>AP &amp; Statin</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="No AP or statin" /></td>
<td><img src="image2.png" alt="AP &amp; Statin" /></td>
</tr>
</tbody>
</table>

- For every 25 patients treated, discharge on an antiplatelet agent and statin medication is associated with 3.5 additional patients alive at 5 years!
- VQI participation is highly associated with improvement in medication use

Conclusion:
Medical management is associated with improved survival after a number of vascular procedures. Importantly, VQI participation improves the use of medical management, demonstrating that involvement in an organized quality effort can affect patient outcomes.

National QI Initiative to Increase Statin Use

AP/Statin Rate, Centers in VQI 2011-Present

Mean rate = 79.9%

Mean ± 3SD

Presentation, Publication, Push Reports

Jan-11  Jan-12  Jan-13  Jan-14  Jan-15  Jan-16  Jan-16

SVS | PSO
PATIENT SAFETY ORGANIZATION
Regional Participation Is Important

Discharge Statin Use

Region ID

P<0.05

P=NS
Not all patients are getting appropriate medical treatment before or after their vascular operation.
Some centers can reach 100%, others less so.
Type of surgery seems to impact medication use.
Medication use after surgery is associated with overall survival.
Learning Points

- Length of participation in VQI appears to improve medication use
  - Participation in regional meeting may be important
  - Review of center level data is necessary
  - Processes need to be developed at each institution to make improvements
Does your patient have an indication for statin use?

- Answer for nearly all patients in VQI will be yes because they have clinically evident atherosclerotic cardiovascular disease

- That may not apply to all patients...
  - Maybe a younger patient with vasculitis
  - Popliteal artery aneurysm, etc
Aspirin Prescribing

- Fairly simple

- Aspirin 75-325mg (typically 81mg) daily
  - To reduce the risk of MI, stroke, or vascular death
    - Level IB recommendation
  - Higher doses (325mg) have been associated with higher bleeding risks without other clinical benefit

- Clopidogrel (Plavix) is a reasonable alternative to aspirin
A tad more complex

- Statins carry the risk of
  - Muscle aches
  - Liver damage
  - Elevated blood sugar

- Start with do they need to be on a statin?
Baseline laboratory measurements
- Fasting lipid panel
- ALT
- CK (if indicated)

Initiate high vs intermediate does statin as indicated by guidelines
Reassess lipid panel in 4-12 weeks
Many reactions to medication may be mediated by reduction of dose or transition to a different statin
Uncomfortable Prescribing

- Most common reason
  - I don’t manage these medications
  - Not appropriate for me to start therapy
  - PCP needs to start/monitor
  - Etc, etc

- Not a reason to skip treatment
Uncomfortable Prescribing

- Check baseline labs
- Prescribe appropriate dose statin
- Inform PCP of medication change and allow follow up
Tools available

- Data!
- Online resources through M2S
Discharge Medication Communications

As part of the QI process, vascular specialists are encouraged to communicate with primary care physicians, patients and other providers regarding the use of discharge medications.

Below please see links to sample communications currently in use within the VQI:

**Risk Factor Modification**

- Risk Factor Modification Letter – Patient
- Risk Factor Modification Letter – Physician

**Sample Letters by Type of Medication (Hospital Setting)**

- **Aspirin**
  - Letter to Patient
  - Letter to Physician

- **ACE Inhibitor**
  - Letter to Patient
  - Letter to Physician

- **Beta Block**
  - Letter to Patient
  - Letter to Physician

- **Statin**
  - Letter to Patient
  - Letter to Physician

- **Multiple Medications**
  - Letter to Patient
  - Letter to Physician
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Discharge Medications: Reaching and Sustaining our Goal of 100%

Presented by:

Randell R. De Martino, MD, MS

Cheryl R. Jackson, DNP, MS, RN, CPHQ
Recommendations/Implications

Sustainability
- System level changes were implemented
  - The antiplatelet and statin medications are imbedded in the discharge order sets
  - Electronic Medical Record
  - Process easily transferable

Implication
- Correlate Go With the Flow project to readmission rates for the PVI patient population
Lessons Learned

- Identify all stakeholders
- Validity
- Be patient
- Be vigilant
- Be realistic
Dissemination of Findings

- **Organization (System)**
  - Stakeholders
  - Direct care givers
  - Upper management

- **Publications**
  - *Association of peri-Operative Registered Nurses*
  - *Journal of Vascular Nursing*
The first step in decreasing mortality rate and increasing graft patency at one year and five years in the PVI patient is to prescribe antiplatelet and statin therapy at discharge.
EVAR LONG TERM FOLLOW-UP IMAGING: UNDERSTANDING CURRENT TRENDS TO IMPROVE THE FUTURE

Adam Beck, MD, FACS
Sal Scali, MD, FACS
Outline

• Background
• VQI Trends
• QI Initiative
• Focus Group Feedback
• Future Directions
EVAR patient without imaging follow-up = Unrepaired AAA
What method(s) do you most frequently use to contact your patient whey they miss their follow-up appointment after EVAR?

- Phone call
- Letter
- Email
- Automated reminder
Mechanisms of EVAR Failure

Device Factors
- Lack of fixation
- Integrity issues

Patient Factors
- Short neck
- Angulation
- Thrombus
- Tortuosity
- Occlusive disease
- Progression of disease

Physician Factors
- Poor device selection
- Lack of judgment, knowledge, or skill
- Other interest (e.g., financial, ego bias, etc.)

Johnstone & Oderich Endovasc Today 2/2014
• Postoperative imaging surveillance recommended by societies and regulatory agencies

• Recent studies suggest low compliance with follow-up imaging

• Improving compliance with postoperative surveillance has been identified as a major opportunity for surgical quality improvement

Garg et al. JAMA Surg. 2015;150(10):957-963
## Current Guidelines EVAR Surveillance: ACR

### Clinical Condition:
Abdominal Aortic Aneurysm: Interventional Planning and Follow-up

#### Variant 1:
Follow-up for pre-endovascular repair (EVAR) or open repair of AAA.

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTA abdomen and pelvis with IV contrast</td>
<td>9</td>
<td>For evaluation of known AAA without thoracic aortic involvement. Noncontrast sequence is not necessary.</td>
</tr>
<tr>
<td>CTA chest abdomen pelvis with IV contrast</td>
<td>8</td>
<td>Useful for patients with suspected AAA but no prior workup of the thoracic aorta. Study of choice for workup of infrarenal AAA or thoracic aneurysm.</td>
</tr>
<tr>
<td>CT abdomen and pelvis without IV contrast</td>
<td>6</td>
<td>At physician’s discretion, may not be included. Appropriate for patients without contraindications to contrast. Occasionally depot density differences, requiring delayed scanning with most thoracic. Otherwise, further limited research with MRA, US, or DSA would be preferred.</td>
</tr>
<tr>
<td>MRA abdomen and pelvis without and with IV contrast</td>
<td>6</td>
<td>Alternative to CTA in patients with known AAA, not involving the thoracic aorta and in whom contrasted is contraindicated.</td>
</tr>
<tr>
<td>CT chest abdomen pelvis without IV contrast</td>
<td>5</td>
<td>Suitable for patients with contraindications to contrast. Occasionally depot density differences, requiring delayed scanning with most thoracic. Otherwise, further limited research with MRA, US, or DSA would be preferred.</td>
</tr>
<tr>
<td>Digital subtraction angiography (DSA)</td>
<td>5</td>
<td>May be appropriate in select cases, i.e., when there is a poor opacification of branch vessels of the aorta. An alternative to CTA.</td>
</tr>
<tr>
<td>MRA chest abdomen pelvis without and with IV contrast</td>
<td>5</td>
<td>Alternative to CTA in patients with contraindications to contrast. May have a prior evaluation of thoracic aorta.</td>
</tr>
<tr>
<td>MRA abdomen and pelvis without IV contrast</td>
<td>4</td>
<td>Appropriate for patients with acute renal failure. At physician’s discretion, may not be included. Useful screening tool, but insufficient for AAA treatment planning. May be used in tandem with DSA in the element of severe renal insufficiency, or as an adjunct to noncontrast CT for initial evaluations.</td>
</tr>
<tr>
<td>US aorta abdomen with Doppler</td>
<td>5</td>
<td>Important adjunct to noncontrast CT for endoleak detection. May be useful in endoleak characterization. Provides detailed survey for structural integrity of the metallic components of the endograft but not the nonmetallic components. Particularly useful with tortuous anatomy.</td>
</tr>
</tbody>
</table>

#### Variant 2:
Follow-up for post-endovascular repair (EVAR) or open repair of AAA.

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRA abdomen and pelvis without and with IV contrast</td>
<td>7</td>
<td>Appropriate alternative to CTA, but less accurate for assessing endograft metallic components. Effectiveness depends on composition of endoprosthesis. 3D contrast-enhanced MRA and time-resolved MRA are highly sensitive to endoleaks.</td>
</tr>
<tr>
<td>CT abdomen and pelvis without IV contrast</td>
<td>6</td>
<td>Appropriate for patients with MR-incompatible devices or contraindications to iodinated contrast. Provides temporal information regarding the morphology with reduced contrast exposure and radiation burden. US is a useful adjunctive tool for endoleak detection.</td>
</tr>
<tr>
<td>Digital subtraction angiography (DSA)</td>
<td>6</td>
<td>Selectively useful for characterization and treatment of endoleaks type I and III.</td>
</tr>
<tr>
<td>MRA abdomen and pelvis without IV contrast</td>
<td>5</td>
<td>Selectively useful for assessment of renal or mesenteric vasculature in patients with contraindications to iodinated contrast.</td>
</tr>
</tbody>
</table>

#### Rating Scale: 1.0 Usually not appropriate; 4.0 May be appropriate; 7.0 Usually appropriate

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**QI Webinar Series**

**American College of Radiology**

**ACR Appropriateness Criteria**

**ACR Appropriateness Criteria**

**AAA Interventional Planning & Follow-Up**

**SVS|PSO**

**PATIENT SAFETY ORGANIZATION**
"We currently recommend contrast enhanced CT imaging at 1 and 12 months during the first year after EVAR."

Question #2

When is the first time that you discuss long term follow-up with your EVAR patients?

- During pre-surgical visit
- At hospital discharge
- At first post op visit

Percent

0 20 40 60 80 100
CLINICAL STUDY

Current Clinical Practice in Postoperative Endovascular Aneurysm Repair Imaging Surveillance

Heiko Uthoff, MD, Constantino Peña, MD, Barry T. Katzen, MD, Ripal Gandhi, MD, James West, James F. Benenati, MD, and Philipp Geisbüsch, MD
<table>
<thead>
<tr>
<th></th>
<th>Pre-EVAR</th>
<th>Disc.</th>
<th>1 mo</th>
<th>3 mo</th>
<th>6 mo</th>
<th>1 y</th>
<th>2 y</th>
<th>3 y</th>
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<td>Any phase</td>
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<tr>
<td>Contrast-enhanced</td>
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<td>0.6</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Implantable sac pressure</td>
<td>0.8</td>
<td>1.6</td>
<td>2.1</td>
<td>1.2</td>
<td>2.9</td>
<td>3.3</td>
<td>3.1</td>
<td>2.9</td>
<td>2.7</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Uthoff et. al. JVIR;2012:1152-1159
Follow-up Compliance

Follow-Up Compliance After Endovascular Abdominal Aortic Aneurysm Repair in Medicare Beneficiaries

Andres Schanzer, MD¹, Louis M. Messina, MD¹, Kaushik Ghosh, PhD², Jessica P. Simons, MD, MPH¹, William P. Robinson III, MD¹, Francesco A Aiello, MD¹, Robert J. Goldberg, PhD¹, and Allison B. Rosen, MD, MPH, ScD¹,²

¹University of Massachusetts Medical School, Worcester, MA
²National Bureau of Economic Research, Cambridge, Massachusetts

*19,962 Medicare beneficiaries (age ≥ 65) EVAR 2001-2008*
EVAR Procedures: Medicare Beneficiaries

Number of Hospitalizations for EVAR procedures per 100,000 Medicare Beneficiaries

P-value for trend < .001

2.5-fold increase in annual EVAR procedures [1400 in 2001 vs 3529 in 2008]

Proportion Lost to LTFU: Medicare

Proportion lost to follow-up at 1, 3 and 5 years: 22%, 38%, and 50%
Percentage Lost to LTFU: Medicare

### Predictors of Lost to LTFU: Medicare

<table>
<thead>
<tr>
<th>Variable</th>
<th>HR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (vs. 65-69 yrs)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-79</td>
<td>1.23</td>
<td>1.15-1.32</td>
</tr>
<tr>
<td>80-85</td>
<td>1.45</td>
<td>1.35-1.55</td>
</tr>
<tr>
<td>&gt;85</td>
<td>2.03</td>
<td>1.8802.20</td>
</tr>
<tr>
<td><strong>Ruptured AAA (vs. Elective AAA)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urgent/symptomatic AAA</td>
<td>1.84</td>
<td>1.63-2.08</td>
</tr>
<tr>
<td></td>
<td>1.27</td>
<td>1.20-1.35</td>
</tr>
<tr>
<td><strong>Comorbidities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHF</td>
<td>1.52</td>
<td>1.43-1.61</td>
</tr>
<tr>
<td>CRI</td>
<td>1.37</td>
<td>1.27-1.49</td>
</tr>
<tr>
<td>COPD</td>
<td>1.29</td>
<td>1.23-1.35</td>
</tr>
<tr>
<td>CVOD</td>
<td>1.07</td>
<td>1.01-1.15</td>
</tr>
<tr>
<td>Cancer</td>
<td>1.12</td>
<td>1.06-1.19</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.07</td>
<td>1.02-1.13</td>
</tr>
<tr>
<td><strong>US Region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Midwest</td>
<td>1.05</td>
<td>0.98-1.11</td>
</tr>
<tr>
<td>South</td>
<td>1.10</td>
<td>1.031.17</td>
</tr>
<tr>
<td>West</td>
<td>1.16</td>
<td>1.07-1.25</td>
</tr>
</tbody>
</table>

Does Poor LTFU Matter Clinically?
Endovascular aneurysm repair patients who are lost to follow-up have worse outcomes

Caitlin W. Hicks, MD, MS,a Devin S. Zarkowsky, MD,b Ian C. Bostock, MD, MS,b David H. Stone, MD, MHS,b James H. Black III, MD,a Jens Eldrup-Jorgensen, MD,c Philip P. Goodney, MD, MS,b and Mahmoud B. Malas, MD, MHS,a Baltimore, Md; Lebanon, NH; and Portland, Me

ARTICLE HIGHLIGHTS

- **Significance:** This study compares 5-year outcomes after endovascular aneurysm repair (EVAR) of patients who were lost to follow-up or had phone call follow-up with those of patients who had follow-up in-person.
- **Type of Research:** Retrospective analysis of prospectively collected Vascular Quality Initiative (VQI) data.
- **Take Home Message:** This study of 11,309 elective EVAR patients revealed that patients who are lost to follow-up and those with phone call follow-up have higher 5-year all-cause mortality compared with patients who follow up in-person.
- **Recommendation:** The authors suggest that lack of follow-up after EVAR is a risk factor for increased 5-year mortality.
- **Strength of Recommendation:** 2. Weak
- **Level of Evidence:** B. Low to very low
**Impact of Loss to LTFU: VQI**

**Fig 2.** Kaplan-Meier curves showing survival after endovascular aneurysm repair (EVAR) among patients with in-person follow-up vs phone call follow-up vs no follow-up using the aggregate unmatched cohort (A) and matched cohort (B).
**Table IV. Multivariable analysis**

<table>
<thead>
<tr>
<th>Variable</th>
<th>HR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow-up method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-person</td>
<td>Reference</td>
<td>—</td>
</tr>
<tr>
<td>Phone call</td>
<td>3.48 (2.66-4.57)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>None</td>
<td>6.45 (4.89-8.51)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Age (per year)</td>
<td>1.05 (1.04-1.06)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Black race</td>
<td>0.62 (0.37-1.04)</td>
<td>.07</td>
</tr>
<tr>
<td>Primary insurance, self-pay</td>
<td>2.61 (1.18-5.78)</td>
<td>.02</td>
</tr>
<tr>
<td>Unfit for open surgery</td>
<td>1.60 (1.28-2.00)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Smoking (any)</td>
<td>1.27 (0.97-1.68)</td>
<td>.09</td>
</tr>
<tr>
<td>CHF</td>
<td>1.60 (1.26-2.03)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>COPD</td>
<td>1.25 (1.02-1.54)</td>
<td>.03</td>
</tr>
<tr>
<td>Dialysis</td>
<td>2.68 (1.56-4.62)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Postoperative renal failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute kidney injury</td>
<td>1.66 (1.06-2.62)</td>
<td>.03</td>
</tr>
<tr>
<td>Temporary dialysis</td>
<td>5.80 (2.44-13.8)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Discharge to nursing home</td>
<td>2.01 (1.39-2.90)</td>
<td>.04</td>
</tr>
</tbody>
</table>

*CHF: Congestive heart failure; CI: confidence interval; COPD, chronic obstructive pulmonary disease; HR, hazard ratio.

※C statistic = 0.81.
Fig 3. Kaplan-Meier curves showing survival after endovascular aneurysm repair (EVAR) stratified by both follow-up method and the presence or absence of immediate postoperative (A) or long-term (B) endoleak. There are no significant differences in survival for each group based on endoleak status (all, P = NS).
Question #3

What is the most common reason that patients miss a follow-up appointment after EVAR in your practice?

- Travel/distance
- Financial/insurance/patient cost share
- Referring physician prefers to see patient
- Patient illness/disability or death
- Other

Percent

0 20 40 60 80 100
What is the most frequent method used in your practice to communicate routine patient reminders about upcoming EVAR follow-up?

- Phone call
- Letter
- Email
- Smart phone reminder
- Automated reminder

Percent
Current Trends in EVAR Surveillance in the VQI
AAA Care in the VQI

EVAR Procedures in VQI by Year

Procedures entered into EVAR registry

0 1000 2000 3000 4000 5000 6000 7000

VQI EVAR Volume by Region

EVAR Procedures Contributed to VQI by Region

- Midsouth
- So. Cal.
- Nor. Cal.
- Others
- Pacific NW
- Michigan
- Midwest
- G. Lakes
- Rocky Mtns.
- Southeast
- New York
- Up. Midwest
- Virginias
- Mid-Atlantic
- Carolinas
- N. England
EVAR LTFU in VQI

LTFU in EVAR by Year

Percentage with 5 months or greater follow-up

EVAR LTFU in VQI by Region

LTFU in EVAR by Region (2014 Cases)

- Percentage with 6 months or more follow-up

VQI EVAR LTFU Imaging

Imaging Performed 9-21 Months Postop in EVAR by Year

Percentage with imaging between 9 and 21 months


Percentage values: 56% (2011), 56% (2012), 53% (2013), 57% (2014)
EVAR LTFU Imaging Modality in VQI

Types of Imaging Performed (2011-2015, Among Those Imaged)

- CTA: 45%
- Duplex: 35%
- CT: 10%
- Angio: 5%
- Xray: 5%
- MRA: 5%
- MR: 5%
## Features Associated with Missing LTFU Imaging after EVAR in VQI

<table>
<thead>
<tr>
<th>Variable</th>
<th>Not imaged (N=7959) 54%</th>
<th>Imaged (N=6852) 46%</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>20%</td>
<td>18%</td>
<td>.005</td>
</tr>
<tr>
<td>Non-white race</td>
<td>10%</td>
<td>8%</td>
<td>.002</td>
</tr>
<tr>
<td>BMI</td>
<td>28.0</td>
<td>28.2</td>
<td>.01</td>
</tr>
<tr>
<td>Medicare</td>
<td>64%</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>Private insurance</td>
<td>30%</td>
<td>33%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Non-home discharge</td>
<td>9%</td>
<td>5%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Hospital transfer</td>
<td>9%</td>
<td>5%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Current smoker</td>
<td>56%</td>
<td>44%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>History of Prior Aortic Surgery</td>
<td>5%</td>
<td>3%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>CHF</td>
<td>11%</td>
<td>10%</td>
<td>.007</td>
</tr>
<tr>
<td>COPD</td>
<td>32%</td>
<td>29%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>On hemodialysis preoperatively</td>
<td>1.2%</td>
<td>0.7%</td>
<td>.002</td>
</tr>
<tr>
<td>Not living at home preop</td>
<td>1.5%</td>
<td>1.0%</td>
<td>.006</td>
</tr>
<tr>
<td>Non-ambulatory preoperatively</td>
<td>8.5%</td>
<td>6%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>ASA 4 or 5</td>
<td>26%</td>
<td>23%</td>
<td>.0002</td>
</tr>
<tr>
<td>Non-elective admission</td>
<td>14%</td>
<td>10%</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Endoleak at case completion</td>
<td>22%</td>
<td>26%</td>
<td>&lt;.00001</td>
</tr>
</tbody>
</table>
What is the national rate of EVAR patients that do not have imaging results?

- 0 – 20%
- 21 – 40%
- 41 – 60%
- 61 – 80%
- More than 80%
How do we improve?
Quality Initiative

Improve rates of postoperative EVAR surveillance
SVS PSO Launches 2 National Initiatives

The SVS Patient Safety Organization (SVS PSO) is launching two national initiatives aimed at improving patient care with a data-driven approach.

They are:
- Reminding vascular surgeons to prescribe antithrombotic agents and statins to vascular patients to improve long-term outcomes, led by Dr. Randall R. DeMartino, co-chair of the Vascular Medicine Registry
- Promoting follow-up imaging at one year for endovascular aneurysm repair (EVAR) patients, led by Dr. Salvatore Scali, EVAR registry chair.

For both initiatives, the SVS PSO is creating too kits and educational webinars for members, promoting best practices and offering comparative benchmarks. "We issue reports with registry data that show that certain practices can improve patients' outcomes," said Dr. Jens Ekdrup-Jorgensen, SVS PSO medical director. "We also provide biannual data releases to help hospitals assess their performance over time and in comparison to other facilities nationally and within their region."

Discharge medications
For example, the Vascular Quality Initiative (VQI) released data last year on the impact of prescribing statins after discharge and how it improved patient outcomes. Patients on statins and antithrombotic agents had an impressive improvement in five-year survival rates compared to patients on neither medication, or on only one. Members found the data so compelling that the SVS PSO is expanding the initiative at the local and national levels.

"Two components are essential for improvement: proper discharge planning and follow-up information and patient education/compliance. There are a number of ways that high-performing hospitals facilitate the process," said Dr. Adam Beck, chair of the Arterial Quality Committee. "Some have instituted new standing orders and reminders in their electronic medical records, or have nurse navigators work one-on-one with patients to make sure they have the appropriate prescriptions. It is critical that patients understand the importance of taking their medications before they leave the hospital and then maintain contact with their vascular surgeon," he said.

EVAR Long-term Follow-up Imaging
The second initiative emphasizes the importance of long-term follow-up care – with imaging as a crucial component – for EVAR patients.

"We feel surgeons should follow up close to 100 percent of their patients at one year after EVAR with imaging," said Dr. Ekdrup-Jorgensen. "Currently those figures aren’t as high as they should be."

The imaging – MRIs, CTs or ultrasounds – at one year is vitally important to document the adequacy of the AAA repair, he said. Non-invasive imaging is critical to assessing the success of the aneurysm repair and determining the presence of an endoleak that might require re-intervention.

Both national quality initiatives require continuous effort and rely upon data to monitor the effectiveness of these efforts, said Dr. Beck. "We issue hospital and physician reports every six months; providers have to be conscious of checking their data to be sure quality improvements stay in place," he said. Information now being collected underscores the importance of developing and maintaining long-term relationships with patients – a practice SVS members not only endorse but also prize.

"It’s exciting to know that VQI members are using this registry data to improve care," said Dr. Ekdrup-Jorgensen. "The mission of VQI is to improve the care of the vascular patient and we are pleased that we can provide data that allows providers to improve their care and up their game."

For more information, contact Nadine Caputo, quality director, at ncaputo@svspso.org.
Eligible window for LTFU

Long-term follow-up interval

Postoperative month
EVAR LTFU QI Project Strategy

- Focus Groups
- Webinar
- Questionnaire/Survey
- Pilot project
- Email blast/Push Report
- National Meeting
- Fall Regional Meeting
- Publication
Focus Groups

Lessons Learned from High Performing VQI Centers With Excellent (≥80%) EVAR LTFU Imaging Surveillance
Organizational Success Factors

• Strong relationships with physician private practices
• Physician leadership
• Staff person responsible for LTFU
• Patient education – early (pre-op) and often
• Communication of patient expectations (follow-up forever)
Processes that work at high performing centers

• Protocol for LTFU beginning at 9 months – 21 months post EVAR
• Multiple reminders/communication channels (letters, phone, texts, patient portals)
• Same day imaging and follow-up visits
• Automated tracking of missed visits
• Communication with multiple staff on LTFU status; monthly data runs
Challenges

- Transfer patients – out of area
- Tracking hard to reach patients: Facebook, obits, certified letters
COPI and Physician Reports

• In addition to the spring and fall regional reports, this year we have published three COPI reports:
  – 30-day stroke and 1-year mortality after CEA
  – 30-day stroke or 1-year mortality after CAS
  – COPI report on hematoma after PVI

• We have also published three surgeon-level reports:
  – Percentage of high-risk patients receiving CEA
  – Percentage of patients receiving follow-up imaging after EVAR
  – Surgeon-level report on percentage of high-risk patients receiving CAS

• 2017 Plan to repeat previous reports:
  – First one is CEA LOS