BMC2 VASCULAR INTERVENTION COLLABORATIVE REVIEW

NOVEMBER 2017

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Professor of Surgery

Michigan Medicine and
VA Ann Arbor Health Care System
Vascular Surgery Participating Hospitals

- UP Health System, Marquette
- Munson Medical Center, Traverse City
- McLaren Northern Michigan, Petoskey
- Mid Michigan Health Gratiot, Alma
- McLaren Greater Lansing
- Spectrum Health, Grand Rapids
- Mercy Health St. Mary's Campus, Grand Rapids
- Metro Health Hospital, Wyoming
- Covenant, Saginaw
- McLaren Bay Region, Bay City
- Genesys, Grand Blanc
- McLaren Flint, Flint
- St. Joseph Mercy, Oakland
- Beaumont, Troy
- Beaumont, Royal Oak
- Beaumont, Grosse Pointe
- McLaren Macomb, Mount Clemens
- Borgess, Kalamazoo
- Bronson Methodist, Kalamazoo
- Lakeland Regional Medical Center, St. Joseph
- Huron Valley Sinai, Commerce Two
- Beaumont, Farmington
- Garden City Hospital, Garden City
- St. Joseph Mercy, Ann Arbor
- University of Michigan, Ann Arbor
- Henry Ford Allegiance, Jackson
- St. John's, Detroit
- DMC Heart Hospital, Detroit
- Sinai Grace, Detroit
- Henry Ford, Detroit
- Beaumont, Dearborn
Participating VS Sites Over Time

Closure of PVI led to 4 small volume sites dropping VS collection –
Only accounted for approximately 250 discharges per year
Procedures Collected to Date: 2012 – Q1/Q2 2017

- **Vascular Surgery Procedures**
  - EVAR – 4912
  - Open AAA – 1023
  - Open Bypass – 8911

- **Carotid Procedures**
  - Carotid Stent – 2538
  - Carotid Endarterectomy – 11,320

- **Total Procedures 2012 – Q1/Q2 2017** = 28,704
VASCULAR SURGERY

MULTI YEAR DATA REVIEW

2012 – Q1/Q2 2017
CAS/CEA Indications: 2012 – Q1/Q2 2017

CAS Indications by Year

CEA Indications by Year
Combined Stroke, Death, & MI to 30 days

* Discharge level outcomes, Stroke/TIA separated as outcomes in 2014
Open Bypass: 2012 – Q1/Q2 2017

Procedural Indication: Open Bypass

* Multiple indications may be selected, other options available
Open Bypass: 2012 – Q1/Q2 2017

Procedure Type

- Femoral-Popliteal
- Other Outflow
- Femoral-Femoral
- Femoral-Tibial
- Aorto-Bi/Femoral
- Axillary-Femoral

Yearly Trends

- 2012: n = 1011
- 2013: n = 1306
- 2014: n = 1601
- 2015: n = 2023
- 2016: n = 2036
- Q1/Q2 2017: n = 934
Discharge Level Death & Major Morbidities at 30 Days

- **Post-op Transfusion (PRBCs)**
- **Graft Failure**
- **Death**
- **MI**
- **Amputation**

For the years 2012 to Q1/Q2 2017:

- **Post-op Transfusion (PRBCs)**
  - 2012: n = 942
  - 2013: n = 1216
  - 2014: n = 1420
  - 2015: n = 1908
  - 2016: n = 1920
  - Q1/Q2 2017: n = 884

- **Graft Failure**
- **Death**
- **MI**
- **Amputation**

2015/2016/2017 = AKA/BKA
EVAR Indications

Asymptomatic
Abdominal/Back Pain
Rupture
Size of Iliac Aneurysm (added in 2015)

* Multiple indications may be selected, other options available
EVAR: 2012 – Q1/Q2 2017

Elective EVAR Death & Major Morbidities at 30 Days

- Readmission
- Death
- MI
- Renal Failure
- Bleeding (>=4PRBCs)

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>467</td>
</tr>
<tr>
<td>2013</td>
<td>585</td>
</tr>
<tr>
<td>2014</td>
<td>768</td>
</tr>
<tr>
<td>2015</td>
<td>920</td>
</tr>
<tr>
<td>2016</td>
<td>1014</td>
</tr>
<tr>
<td>Q1/Q2</td>
<td>543</td>
</tr>
</tbody>
</table>
EVAR: 2012 – Q1/Q2 2017

Urgent/Emergent EVAR Death & Major Morbidities at 30 Days

- Death
- Bleeding (>=4PRBCs)
- Renal Failure
- MI
- Readmission


Number of cases:
- 2012: 78
- 2013: 83
- 2014: 76
- 2015: 143
- 2016: 154
- Q1/Q2 2017: 77
Open AAA: 2012 – Q1/Q2 2017

Open AAA Indications

Asymptomatic
Abdominal/Back Pain
Rupture
Size of Iliac Aneurysm (added in 2015)

* Multiple indications may be selected, other options available
Open AAA: 2012 – Q1/Q2 2017

Elective Open AAA Death & Major Morbidities at 30 Days

- Bleeding (>=4 PRBCs)
- Death
- Renal Failure
- Readmission
- MI

<table>
<thead>
<tr>
<th>Year</th>
<th>Bleeding</th>
<th>Death</th>
<th>Renal Failure</th>
<th>Readmission</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>11%</td>
<td>-1%</td>
<td>5%</td>
<td>1%</td>
<td>3%</td>
</tr>
<tr>
<td>2013</td>
<td>13%</td>
<td>1%</td>
<td>7%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>2014</td>
<td>11%</td>
<td>9%</td>
<td>9%</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>2015</td>
<td>13%</td>
<td>11%</td>
<td>11%</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>2016</td>
<td>11%</td>
<td>13%</td>
<td>13%</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>Q1/Q2 2017</td>
<td>13%</td>
<td>15%</td>
<td>15%</td>
<td>11%</td>
<td>13%</td>
</tr>
</tbody>
</table>
Open AAA: 2012 – Q1/Q2 2017

Urgent/Emergent Open AAA Death & Major Morbidities at 30 Days

- Death
- Bleeding (>=4PRBCs)
- Renal Failure
- Readmission
- MI

Data for years 2012 to 2016 and Q1/Q2 2017 with respective counts:
- 2012: n = 33
- 2013: n = 48
- 2014: n = 73
- 2015: n = 73
- 2016: n = 67
- Q1/Q2 2017: n = 35
Post-Operative MI Rate: 2012 – Q1/ Q2 2017

Post-Operative MI Rates (30 days) Over Time

Overall MI Rate  CVOD  Open Bypass  AAA
Post-Operative Transfusion Rate: 2012 – Q1/Q2 2017

Overall Transfusion Rates: Open Bypass, EVAR, and Open AAA – PRBCs only

* Not all data available due to changes in data collection
Post-Operative Transfusion Rate: 2012 – Q1/Q2 2017

30 day transfusion rates: Open Bypass, EVAR, and Open AAA – PRBCs only
## Readmission at 30 Days: 2012 – Q1/Q2 2017

### Readmission Rate at 30 Days (EVAR, Open AAA, Open Bypass)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Readmission Rate</strong></td>
<td>132/1409 (9.4%)</td>
<td>132/1809 (7.3%)</td>
<td>203/2243 (9.1%)</td>
<td>282/2679 (10.5%)</td>
<td>358/2808 (12.7%)</td>
<td>174/1359 (12.8%)</td>
</tr>
<tr>
<td>Lymph Leak</td>
<td>31/132 (23.5%)</td>
<td>13/132 (9.8%)</td>
<td>29/203 (14.3%)</td>
<td>25/282 (8.9%)</td>
<td>30/358 (8.4%)</td>
<td>14/174 (8.0%)</td>
</tr>
<tr>
<td>Wound Infection/dehiscence</td>
<td>79/132 (59.8%)</td>
<td>94/132 (71.2%)</td>
<td>147/203 (72.4%)</td>
<td>122/282 (43.3%)</td>
<td>161/358 (45.0%)</td>
<td>70/174 (40.0%)</td>
</tr>
<tr>
<td>Graft Infection</td>
<td>3/132 (2.3%)</td>
<td>8/132 (6.1%)</td>
<td>11/203 (5.4%)</td>
<td>20/282 (7.1%)</td>
<td>20/358 (5.6%)</td>
<td>13/174 (7.5%)</td>
</tr>
<tr>
<td>Anticoagulation Complication</td>
<td>8/132 (6.1%)</td>
<td>9/132 (6.8%)</td>
<td>14/203 (6.9%)</td>
<td>14/282 (5.0%)</td>
<td>16/358 (4.5%)</td>
<td>4/174 (2.3%)</td>
</tr>
<tr>
<td>Thrombectomy/lysis</td>
<td>16/132 (12.1%)</td>
<td>18/132 (13.6%)</td>
<td>28/203 (13.8%)</td>
<td>20/282 (7.1%)</td>
<td>28/358 (7.8%)</td>
<td>10/174 (5.7%)</td>
</tr>
<tr>
<td>Other</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>97/288 (33.7%)</td>
<td>103/358 (28.8%)</td>
<td>68/174 (39.1%)</td>
</tr>
</tbody>
</table>

* Multiple reasons for readmission may be selected

“Other” added as reason for readmission in 2015
Readmission at 30 Days: 2012 – Q1/Q2 2017

Percent of 30 day readmissions for wound/graft infection by year

* n = total number of readmissions
BMC2 SSI Variables: 2012 – Q1/Q2 2017

Percent of procedures utilizing chlorhexidine & alcohol skin prep

- 2012: 69.2%
- 2013: 78.7%
- 2014: 80.5%
- 2015: 85.5%
- 2016: 94.2%
- Q1/Q2 2017: 95.8%
BMC2 SSI Variables: 2014 – Q1/Q2 2017

Percent of procedures over 4 hours with antibiotic redosing

* Data collection for this variable began in 2014
VS Medications: 2012 – Q1/Q2 2017

Any antiplatelet at discharge – CEA, CAS, and Open Bypass

* Excludes patients marked as contraindicated
VS Medications: 2012 – Q1/Q2 2017

Statin at discharge – CEA, CAS, and Open Bypass

* Excludes patients marked as contraindicated
AAA CASE REVIEWS
AAA Case Reviews

Initial open AAA size criteria review of BMC2 data 2012-2016 (Q1-Q3)

- Elective procedures only
- Excludes all procedures with the indication:
  - Abdominal/Back Pain
  - Increasing Aneurysm Diameter
  - Size of Iliac Aneurysm (as primary indication for repair)
- Used Max AP Diameter (Male < 55 mm, Female < 50 mm or AP Diameter = Not Documented)
  - Note: Maximum AP Diameter changed to “Maximum Aneurysm Diameter” for 2017 data collection
AAA Case Reviews: Results

571 AAA procedures identified that did not meet size criteria (AAA diameter < 50mm (F) or < 55 (M):

- 280 procedures sent for review (247 EVAR/33 OAAA)
- 31 different sites received procedures for review
- Additional 69 procedures sent for correction by coordinators due to obvious data entry errors (5.5mm entered for AAA diameter instead of 55mm) – did not require physician review

Received 280 reviews to coordinating center: 100%!!
AAA Case Reviews: Results

AAA size distribution of procedures sent for review

*Aneurysms >=55 either programming error by coordinating center or corrected by coordinator at site prior to physician review
AAA Case Reviews: Results

AAAs not meeting size criteria but should be considered appropriate (182 responses):

- 70 (38%) Aneurysm anatomy
- 45 (25%) Other high risk patient conditions
- 50 (28%) Other
- 17 (9%) Documented patient anxiety levels

error in BMC2 assessment
Data inaccurately submitted/AAA diameter definition change
AAA does not appear to meet size criteria
Does not meet size criteria but should be considered appropriate
Frequently identified high risk patient conditions included:

- COPD
- Anticipated major surgery in future (ex. CABG)
- Family history of AAA (captured in BMC2, not included in initial case selection process)

Frequently identified factors related to aneurysm anatomy (to be added as indications in 2018):

- Correction of endoleak from prior procedure
- Concomitant iliac occlusive disease
- Saccular aneurysm
- Presence of LE ischemia/emboli from aneurysm
- Penetrating ulcers
AAA LITERATURE Review
SVS Recommendations for Treatment of AAA

- Patients that present with an AAA and abdominal or back pain, even of an atypical nature, are at increased risk of rupture and intervention is recommended.
- For those who present with an asymptomatic AAA, management is dependent on the size of the aneurysm.
- Elective repair is recommended for patients that present with a fusiform AAA ≥5.5 cm in maximum diameter, in the absence of significant co-morbidities.
SVS Recommendations for Treatment of AAA

**Elective repair is suggested for patients that present with a saccular aneurysm.**

- Level of recommendation: Weak
- Quality of evidence: Low

**Surveillance is recommended for most patients with a fusiform AAA in the range of 4.0 cm to 5.4 cm in maximum diameter.**

- Level of recommendation: Strong
- Quality of evidence: Moderate

**Young, healthy patients, and especially women, with AAA between 5.0 cm and 5.4 cm in maximum diameter may benefit from repair.**

- Level of recommendation: Weak
- Quality of evidence: Low

**The benefit of repairing a small aneurysm is uncertain in patients who will require chemotherapy, radiation therapy, or solid organ transplantation.**

- Level of recommendation: Weak
- Quality of evidence: Low
## Table I. Estimated annual rupture risk

<table>
<thead>
<tr>
<th>AAA diameter (cm)</th>
<th>Rupture risk (%/y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4</td>
<td>0</td>
</tr>
<tr>
<td>4-5</td>
<td>0.5-5</td>
</tr>
<tr>
<td>5-6</td>
<td>3-15</td>
</tr>
<tr>
<td>6-7</td>
<td>10-20</td>
</tr>
<tr>
<td>7-8</td>
<td>20-40</td>
</tr>
<tr>
<td>&gt;8</td>
<td>30-50</td>
</tr>
</tbody>
</table>
## AAA: Risk of Rupture

### Table II. Rupture risk

<table>
<thead>
<tr>
<th></th>
<th>Low risk</th>
<th>Average risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>&lt;5 cm</td>
<td>5-6 cm</td>
<td>&gt;6 cm</td>
</tr>
<tr>
<td>Expansion</td>
<td>&lt;0.3 cm/y</td>
<td>0.3-0.6 cm/y</td>
<td>&gt;0.6 cm/y</td>
</tr>
<tr>
<td>Smoking/COPD</td>
<td>None, mild</td>
<td>Moderate</td>
<td>Severe/steroids</td>
</tr>
<tr>
<td>Family history</td>
<td>No relatives</td>
<td>One relative</td>
<td>Numerous relatives</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Normal blood pressure</td>
<td>Controlled</td>
<td>Poorly controlled</td>
</tr>
<tr>
<td>Shape</td>
<td>Fusiform</td>
<td>Saccular</td>
<td>Very eccentric</td>
</tr>
<tr>
<td>Wall stress</td>
<td>Low (35 N/cm²)</td>
<td>Mdm. (40 N/cm²)</td>
<td>High (45 N/cm²)</td>
</tr>
<tr>
<td>Gender</td>
<td>-</td>
<td>Male</td>
<td>Female</td>
</tr>
</tbody>
</table>

The PIVOTAL study: A randomized comparison of endovascular repair versus surveillance in patients with smaller abdominal aortic aneurysms

Conclusions
Early treatment with endovascular repair and rigorous surveillance with selective aneurysm treatment as indicated both appear to be safe alternatives for patients with small AAAs, protecting the patient from rupture or aneurysm-related death for at least 3 years.

Fig 3. Kaplan-Meier estimates show the composite end point of aneurysm-related death or aneurysm rupture according to assignment to surveillance (dashed line) or early endovascular aneurysm repair (EVAR, solid line). The time to the composite end point did not significantly differ between groups ($P = .99$).
Fig 4. Kaplan-Meier estimates of overall survival with 95% confidence limits are shown according to assignment to surveillance (dashed line) or early endovascular aneurysm repair (EVAR, solid line). Overall survival did not significantly differ between groups ($P = .98$).
Economic analysis of endovascular repair versus surveillance for patients with small abdominal aortic aneurysms

Conclusions: A treatment strategy involving early repair of smaller AAA with EVAR is associated with no difference in total medical costs at 48 months vs surveillance with serial imaging studies. Longer follow-up is required to determine whether the late medical cost increases observed for surveillance will persist beyond 48 months. (J Vasc Surg 2013;58:302-10.)

Table V. Average medical costs by initial aneurysm diameter per patient

<table>
<thead>
<tr>
<th>Variables</th>
<th>Ultrasound surveillance (n = 300)</th>
<th>Early EVAR (n = 314)</th>
<th>Difference (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undiscounted</td>
<td>46,112</td>
<td>48,669</td>
<td>−2557 (−13,156 to 8043)</td>
<td>.63</td>
</tr>
<tr>
<td>Discounted</td>
<td>43,532</td>
<td>47,765</td>
<td>−4232 (−14,025 to 5561)</td>
<td>.40</td>
</tr>
<tr>
<td>AAA 4.00-4.50 cm</td>
<td>(n = 191)</td>
<td>(n = 197)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undiscounted</td>
<td>48,017</td>
<td>47,229</td>
<td>788 (−16,943 to 18,520)</td>
<td>.93</td>
</tr>
<tr>
<td>Discounted</td>
<td>45,121</td>
<td>46,457</td>
<td>−1336 (−17,502 to 14,831)</td>
<td>.87</td>
</tr>
<tr>
<td>AAA 4.51-5.00 cm</td>
<td>(n = 106)</td>
<td>(n = 113)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undiscounted</td>
<td>46,733</td>
<td>51,008</td>
<td>−4276 (−20,294 to 11,742)</td>
<td>.60</td>
</tr>
<tr>
<td>Discounted</td>
<td>44,295</td>
<td>49,918</td>
<td>−5623 (−20,576 to 9330)</td>
<td>.46</td>
</tr>
</tbody>
</table>

AAA, Abdominal aortic aneurysm; CI, confidence interval; EVAR, endovascular aneurysm repair.

aMedical costs are presented as dollars per patient. Discount rate is 3% per annum.
UK Small Aneurysm Trial

Final 12-year follow-up of Surgery versus Surveillance in the UK Small Aneurysm Trial

**Conclusion:** There was no long-term survival benefit of early elective open repair of small abdominal aortic aneurysms. Even after successful aneurysm repair, the mortality among these patients was higher than in the general population.

![Graph showing Kaplan-Meier estimates of overall survival](image)

**Table 3 Causes of death**

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Surgery (n = 563)</th>
<th>Surveillance (n = 527)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All deaths</td>
<td>362</td>
<td>352</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cardiovascular</td>
<td>204 (56-4)</td>
<td>220 (62-5)</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>55 (15-2)</td>
<td>59 (16-8)</td>
</tr>
<tr>
<td>Stroke</td>
<td>27 (7-5)</td>
<td>27 (7-7)</td>
</tr>
<tr>
<td>Thoracic aortic aneurysm rupture and dissection</td>
<td>9 (2-5)</td>
<td>14 (4-0)</td>
</tr>
<tr>
<td>AAA within 30 days of elective repair</td>
<td>26 (7-2)</td>
<td>25 (7-1)</td>
</tr>
<tr>
<td>Primary rupture</td>
<td>11 (3-0)</td>
<td>23 (6-5)</td>
</tr>
<tr>
<td>Secondary rupture*</td>
<td>2 (0-6)</td>
<td>2 (0-6)</td>
</tr>
<tr>
<td>Other cardiovascular</td>
<td>74 (20-4)</td>
<td>70 (20-0)</td>
</tr>
<tr>
<td>Cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cancer</td>
<td>89 (24-6)</td>
<td>67 (19-0)</td>
</tr>
<tr>
<td>Lung</td>
<td>33 (9-1)</td>
<td>21 (6-0)</td>
</tr>
<tr>
<td>Other cancer</td>
<td>56 (15-5)</td>
<td>46 (13-1)</td>
</tr>
<tr>
<td>All other deaths</td>
<td>67 (18-5)</td>
<td>64 (18-2)</td>
</tr>
<tr>
<td>Unknown (patient died abroad)</td>
<td>2 (0-6)</td>
<td>1 (0-3)</td>
</tr>
</tbody>
</table>

Values in parentheses are percentages. Post-mortem investigations were performed in 159 (22.5 per cent) of 706 death certificates; data missing in eight patients.

*Abdominal aortic rupture after abdominal aortic aneurysm (AAA) repair.

THE CONSEQUENCES OF REAL LIFE PRACTICE OF EARLY AAA REPAIR: OBSERVATIONS FROM BMC2
Methodology

- Pre-treatment demographics, comorbidities, and procedure characteristics compared between early and appropriate AAA repair, as are discharge, 30-day, and 1-year morbidity.

- Adjusted comparisons for discharge, 30-day, and 1-year morbidity were then estimated on a propensity score-matched subsample.

- Tables presented below present unadjusted comparisons (columns 2-4) and propensity-score matched comparisons (columns 5-7).

- Pre-treatment variables also presented with comparisons before and after matching in order to assess improvements in balance following matching.
# Discharge and 30 Day Combined Events

<table>
<thead>
<tr>
<th>Variable</th>
<th>Early (n = 469)</th>
<th>Appropriate (n = 3317)</th>
<th>p-value</th>
<th>Early (n = 469)</th>
<th>Appropriate (n = 469)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amputation Post or 30d</td>
<td>6 (1.44%)</td>
<td>3 (0.1%)</td>
<td>&lt; 0.001</td>
<td>6 (1.44%)</td>
<td>1 (0.24%)</td>
<td>0.067</td>
</tr>
<tr>
<td>Death Post or 30d</td>
<td>7 (1.65%)</td>
<td>64 (2.08%)</td>
<td>0.682</td>
<td>7 (1.65%)</td>
<td>3 (0.69%)</td>
<td>0.22</td>
</tr>
<tr>
<td>Dialysis Post or 30d</td>
<td>4 (0.96%)</td>
<td>26 (0.87%)</td>
<td>0.779</td>
<td>4 (0.96%)</td>
<td>1 (0.24%)</td>
<td>0.213</td>
</tr>
<tr>
<td>MI Post or 30d</td>
<td>5 (1.2%)</td>
<td>40 (1.33%)</td>
<td>&gt; 0.999</td>
<td>5 (1.2%)</td>
<td>4 (0.94%)</td>
<td>0.751</td>
</tr>
<tr>
<td>TIA/Stroke Post or 30d</td>
<td>4 (0.96%)</td>
<td>16 (0.53%)</td>
<td>0.294</td>
<td>4 (0.96%)</td>
<td>1 (0.24%)</td>
<td>0.213</td>
</tr>
<tr>
<td>Transfusion Post or 30d</td>
<td>26 (6.15%)</td>
<td>262 (8.63%)</td>
<td>0.101</td>
<td>26 (6.15%)</td>
<td>24 (5.59%)</td>
<td>0.844</td>
</tr>
</tbody>
</table>

Note. N and Percentages. P-values from chi-square or Fisher Exact Test.
Value Based Reimbursement (VBR)

- BCBSM is increasingly looking to reward physicians based on delivery of value through our VBR approach.
- CQI VBR is a component of the Specialist VBR based on CQI participant performance.
- BCBSM agreed to use the CQI registry data to support VBR because of the robust audit processes and clinically relevant data in the registry (vs. claims data).
- CQI coordinating center develops proposed measures and methodology for rewarding VBR at the practice/region/PO level.
- Physicians who meet CQI criteria/targets are eligible for reimbursement can receive an additional 3% increase over the standard fee schedule.
  - Must be a member of PGIP to be eligible
- CQI VBR started in 2017 with MUSIC, 2018 with MOQC.
These are the VS P4P Indicators for 2018:

- Physician meeting participation - 2/10 points, 1/5 points
- Data Coordinator expectations – 5 points
  - Includes completion of 1 year follow-up
    - Meets all expectations (VS/Carotid: 1 Year FU ≥ 80%) = 5
    - Meets most expectations (VS/Carotid: 1 Year FU 60-79%) = 2.5
    - Does not meet expectations (VS/Carotid: 1 Year FU < 60%) = 0
- Internal case reviews – Submitted reviews for ≥ 90% of cases sent for review/10 points, 0 points for < 90%
- EVAR LOS: percent of small/moderate sized elective EVAR NOT discharged by post-operative day two ≤ 10% - 10 points
- Asymptomatic CEA LOS: percent of asymptomatic CEA NOT discharged by post-operative day two ≤ 8%
Follow-up Completion Over Time

Collaborative 30 day follow-up completion by year

- **OBP/EVAR/OAAA**
- **CAS/CEA**

<table>
<thead>
<tr>
<th>Year</th>
<th>OBP/EVAR/OAAA</th>
<th>CAS/CEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>82.1%</td>
<td>91.7%</td>
</tr>
<tr>
<td>2013</td>
<td>88.1%</td>
<td>89.7%</td>
</tr>
<tr>
<td>2014</td>
<td>88.3%</td>
<td>88.6%</td>
</tr>
<tr>
<td>2015</td>
<td>85.1%</td>
<td>85.8%</td>
</tr>
<tr>
<td>2016</td>
<td>89.6%</td>
<td>87.3%</td>
</tr>
<tr>
<td>Q1/Q2 2017</td>
<td>89.2%</td>
<td>90.4%</td>
</tr>
</tbody>
</table>
Follow-up Completion Over Time

Collaborative 1 Year follow-up completion by year

- 2012: 78.9%
- 2013: 75.7%
- 2014: 72.1%
- 2014: 72.2%
- 2014: 68.8%
- 2015: 68.1%
- 2015: 73.2%
- 2015: 73.6%
- 2016: 73.6%
- 2016: 74.2%
* Three sites had 0 qualifying procedures for Q1/Q2 2016
Carotid 1-Year Follow-up by Site (blinded): Q1/Q2 2016

1-Year Follow-up – CEA/CAS

* One site had 0 qualifying procedures for Q1/Q2 2016
2018 Pay for Performance Index (P4P)

- EVAR LOS: percent of small/moderate sized elective EVAR NOT discharged by post-operative day two ≤ 10%
  - Percent EVARs NOT DC'd by post-op day 2 ≤ 10% = 10 points
  - Percent EVARs NOT DC'd by post-op day 2 10-15% = 7.5 points
  - Percent EVARs NOT DC'd by post-op day 2 15-20% = 5 points
  - Percent EVARs NOT DC'd by post-op day 2 >20% = 0 points

- Elective EVARs only
- AAA size < 60mm if male and < 55 if female (NQF definition)
- Based on Q1-Q3 2018 data
Percent of elective EVARs not DC’d by post-op day two

* Small/Moderate sized EVARs without major complication – one site with 0 qualifying procedures
2018 Pay for Performance Index (P4P)

- Asymptomatic CEA LOS: percent of asymptomatic CEA NOT discharged by post-operative day two \( \leq 8\%
  - Percent CEAs NOT DC'd by post-op day 2 \( \leq 8\% \) = 10 points
  - Percent CEAs NOT DC'd by post-op day 2 8-15\% = 7.5 points
  - Percent CEAs NOT DC'd by post-op day 2 15-20\% = 5 points
  - Percent CEAs NOT DC'd by post-op day 2 >20\% = 0 points

- Elective, asymptomatic CEAs only
- Excludes concurrent with CABG
- Based on Q1-Q3 2018 data
Asymptomatic CEA LOS by site (blinded): 2016

Percent of asymptomatic CEAs not DC’d by post-op day two*

* Asymptomatic CEAs without major complication – one site with 0 qualifying procedures, one site at 100% omitted (1/1)
2018 Pay for Performance Index (P4P)

- Internal case reviews – Submitted reviews for ≥ 90% of cases sent for review/10 points, 0 points for < 90%
- Selected CEA/CAS procedures will be sent to sites for internal review
  - Process asks for case review by physician to look at procedural indication
  - Procedure evaluation forms submitted to BMC2 (via Redcap)
- Feedback compiled at the coordinating center for additional analysis
  - Identify gaps in data collection/indications in the BMC2 website
  - Identify documentation issues/omissions at the sites
  - Identify those cases which may not have met criteria for repair
- This work is PRELIMINARY and for quality purposes
CEA/CAS Internal Case Reviews

- Asymptomatic CEA/CAS only
- PSV < 225, DSV < 100, or ICA/CCA Ratio < 2.5
- Percent stenosis on pre-imaging <70%
- Exclude “Concurrent with CABG”
- Exclude restenosis after prior CEA/CAS
Michigan OPEN

- BMC2 is partnering with Michigan OPEN to collect opiate data on patients undergoing vascular surgery
  - Anticipated data collection starting with 2018 procedures:
    - Was the patient on opiates prior to the initial surgery?
    - What pain medication was the patient prescribed at discharge?
    - Is the patient still taking pain medication at the time of follow-up?
    - Did the patient request refills at any point?

- The goal is to develop additional understanding regarding the use of pain medication in the vascular surgery population and develop guidelines/best practices for safer patient care.

- Nine other CQIs have partnered with OPEN in some manner

- Visit [www.michigan-open.org](http://www.michigan-open.org) for additional information
Evaluations & Testimonials

▪ If you/your site is a BMC2 participant, please complete the evaluation and testimonials available in your folder

▪ Please return completed forms to the sign in table
Thank you

- Please email me with any questions or suggestions:
- henke@umich.edu