Vascular Quality Registry Papers of Note

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Risk Factor Optimization and Guideline-Directed Medical Therapy in US Veterans With Peripheral Arterial and Ischemic Cerebrovascular Disease Compared to Veterans With Coronary Heart Disease

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Patients with PAD or ischemic cerebrovascular disease (ICVD) less likely to receive antiplatelet therapy, statin or optimal BP control than those with coronary heart disease (CHD)
Aim

- Study the receipt of guideline-directed medical therapy and risk factor optimization in patients with:
  - PAD alone
  - ICVD alone
  - Concomitant PAD and ICVD

in comparison to patients with CHD in the VA system
Methods - Cohort

- Patients with PCP visit in the VA from 10/1/13-9/30/14 identified via VA data warehouse with a diagnosis of cardiovascular disease by ICD-9 code (CHD, PAD or ICVD)

- Grouped into:
  - PAD alone
  - ICVD alone
  - Concomitant PAD and ICVD
  - CHD (alone and/or with PAD or ICVD)
Methods – Data Sources

- Demographics, lab data and vital signs assessed

- Statin and antiplatelet use: VA pharmacy data assessed for a prescription within 100 days before or 14 days after index visit.  Non-VA medication fields assessed for ASA outside of the VA.

- Patients receiving concomitant anticoagulation were excluded from antiplatelet analysis
**OMT = composite of 4 measures assessed:**

- HTN control  (BP<140/90 mmHg)
- Glycemic control (A1c <7.0% among diabetics)
- Use of statin therapy
- Use of antiplatelet therapy
Methods - Analysis

- Assessment of the frequency of OMT and each individual measure in the 4 patient groups
- Multivariate hierarchical logistic regression across the 4 patient groups
  - Covaraitates of age, gender, race (white vs non), hx of HTN, receipt of care at a teaching vs nonteaching facility, patient assignment to a physician vs nonphysician PCP, number of PCP visits in year prior, provider panel size.
Results - Cohort

All patients with CVD\(^a\) diagnoses in the VA\(^b\) system = 1,266,541

Patients excluded due to hospice or metastatic cancer status: 24,526

All patients included in study: 1,242,015

Patients with CHD\(^c\): 989,380
Patients with PAD\(^d\): 70,404
Patients with ICVD\(^e\): 163,730
Patients with PAD + ICVD: 18,501

a. CVD — Cardiovascular disease  
b. VA — Veterans Affairs  
c. CHD — Coronary Heart Disease  
d. PAD — Peripheral arterial disease  
e. ICVD — Ischemic cerebrovascular disease

Figure 1. Cohort development.
Table 1
Comparison of baseline characteristics of patients with coronary heart disease (CHD), peripheral arterial disease (PAD) alone, ischemic cerebrovascular disease (ICVD) alone, and PAD + ICVD

<table>
<thead>
<tr>
<th>Variable</th>
<th>CHD (n = 989,380)</th>
<th>PAD (n = 70,404)</th>
<th>ICVD (n = 163,730)</th>
<th>PAD + ICVD (n = 18,501)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years, mean/SD)</td>
<td>72.3 ± 10.5</td>
<td>70.3 ± 10.6</td>
<td>70.4 ± 11.6</td>
<td>72.2 ± 9.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Men</td>
<td>973403 (98.4%)</td>
<td>68824 (97.8%)</td>
<td>156513 (95.6%)</td>
<td>18079 (97.7%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>White</td>
<td>772830 (78.1%)</td>
<td>51257 (72.8%)</td>
<td>116199 (71.0%)</td>
<td>14213 (76.8%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Black</td>
<td>96543 (9.8%)</td>
<td>11422 (16.2%)</td>
<td>28735 (17.6%)</td>
<td>2616 (14.1%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Other</td>
<td>22328 (2.3%)</td>
<td>1454 (2.1%)</td>
<td>3934 (2.4%)</td>
<td>355 (1.9%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Unknown</td>
<td>97679 (9.9%)</td>
<td>6271 (8.9%)</td>
<td>14862 (9.1%)</td>
<td>1317 (7.1%)</td>
<td>0.002</td>
</tr>
<tr>
<td>Diagnostic cost group RRS, mean ± SD</td>
<td>1.91 ± 2.96</td>
<td>1.96 ± 2.83</td>
<td>1.95 ± 2.72</td>
<td>2.46 ± 3.39</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Receiving care from a physician provider</td>
<td>746596 (75.5%)</td>
<td>52811 (75.0%)</td>
<td>123778 (75.6%)</td>
<td>14036 (75.9%)</td>
<td>0.099</td>
</tr>
<tr>
<td>Receiving care at a teaching facility</td>
<td>387403 (39.2%)</td>
<td>28531 (40.5%)</td>
<td>69475 (42.4%)</td>
<td>8083 (43.7%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Number of PCP visits in 12 months prior to the index primary care visit, mean ± SD</td>
<td>4.68 ± 5.23</td>
<td>4.82 ± 5.06</td>
<td>4.82 ± 5.06</td>
<td>5.48 ± 5.39</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>461465 (46.6%)</td>
<td>31165 (44.3%)</td>
<td>60913 (37.2%)</td>
<td>8226 (44.5%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Hypertension</td>
<td>812939 (82.2%)</td>
<td>57533 (81.7%)</td>
<td>133983 (81.8%)</td>
<td>16479 (89.1%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Index LDL-C (mg/dL), mean ± SD</td>
<td>84.7 ± 31.9</td>
<td>92.4 ± 32.9</td>
<td>92.6 ± 32.9</td>
<td>88.9 ± 32.3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Index LDL-C &lt; 100 mg/dL</td>
<td>633549 (74.9%)</td>
<td>39151 (64.6%)</td>
<td>89086 (64.5%)</td>
<td>11183 (69.4%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Receiving non-statin lipid lowering agent</td>
<td>109211 (11.0%)</td>
<td>5311 (7.5%)</td>
<td>10786 (6.6%)</td>
<td>1578 (8.5%)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

CHD = coronary heart disease; ICVD = ischemic cerebrovascular disease; LDL = low density lipoprotein; PAD = peripheral arterial disease; PCP = primary care provider; RRS = relative risk score; SD = standard deviation.
Results – unadjusted receipt of OMT

Table 2
Frequency of receipt of optimal medical therapy and risk factor control

<table>
<thead>
<tr>
<th>Measure</th>
<th>CHD (n = 989,380)*</th>
<th>PAD Alone (n = 70,404)</th>
<th>ICVD Alone (n = 163,730)</th>
<th>PAD + ICVD (n = 18,501)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP &lt;140/90 mm Hg</td>
<td>79.8%</td>
<td>75.6%</td>
<td>76.5%</td>
<td>73.5%</td>
<td>0.07</td>
</tr>
<tr>
<td>Statin use</td>
<td>71.5%</td>
<td>59.1%</td>
<td>62.3%</td>
<td>73.3%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>A1c &lt; 7.0% among diabetics</td>
<td>50%</td>
<td>49.4%</td>
<td>54.4%</td>
<td>53.1%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Antiplatelet use</td>
<td>84.4%</td>
<td>66.0%</td>
<td>75.5%</td>
<td>84.6%</td>
<td>0.04</td>
</tr>
<tr>
<td>Composite (optimal medical therapy+)</td>
<td>37.5%</td>
<td>24.4%</td>
<td>31.5%</td>
<td>37.0%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

BP = blood pressure; CHD = coronary heart disease; ICVD = ischemic cerebrovascular disease; PAD = peripheral arterial disease.

* Patient with PAD or ICVD or PAD + ICVD with concomitant CHD included in the CHD category.

† Composite of hypertension control (BP <140/90 mm Hg), statin use, antiplatelet use, and diabetes control (A1c <7.0%) in diabetics.
## Results – Odds of receipt of OMT

### Table 3
Comparison of risk factor control and optimal medical therapy among patients with PAD alone, ICVD alone, and PAD + ICVD adjusting for covariates and clustering at the facility-level using CHD as referent category

<table>
<thead>
<tr>
<th>Outcome</th>
<th>CHD (n = 989,380)*</th>
<th>PAD Alone (n = 70,404)</th>
<th>ICVD Alone (n = 163,730)</th>
<th>PAD + ICVD (n = 18,501)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ref</td>
<td>Unadjusted OR (95% CI)</td>
<td>Adjusted OR (95% CI)†</td>
<td>Unadjusted OR (95% CI)</td>
</tr>
<tr>
<td>BP &lt;140/90 mm Hg</td>
<td>Ref</td>
<td>0.77 (0.75-0.78)</td>
<td>0.78 (0.76-0.79)</td>
<td>0.81 (0.80-0.82)</td>
</tr>
<tr>
<td>Statin use</td>
<td>Ref</td>
<td>0.65 (0.64-0.66)</td>
<td>0.53 (0.53-0.54)</td>
<td>0.69 (0.68-0.70)</td>
</tr>
<tr>
<td>A1c &lt;7.0 among diabetics</td>
<td>Ref</td>
<td>1.08 (1.06-1.10)</td>
<td>1.00 (0.98-1.03)</td>
<td>1.40 (1.38-1.42)</td>
</tr>
<tr>
<td>Antiplatelet use</td>
<td>Ref</td>
<td>0.36 (0.35-0.36)</td>
<td>0.34 (0.34-0.35)</td>
<td>0.57 (0.56-0.57)</td>
</tr>
<tr>
<td>Composite (optimal medical therapy)†</td>
<td>Ref</td>
<td>0.54 (0.53-0.55)</td>
<td>0.54 (0.53-0.55)</td>
<td>0.76 (0.76-0.77)</td>
</tr>
</tbody>
</table>

BP = blood pressure; CHD = coronary heart disease; ICVD = ischemic cerebrovascular disease; OR = odds ratio; PAD = peripheral arterial disease.

* Patient with PAD or ICVD or PAD + ICVD with concomitant CHD were included in the CHD category.
† Adjusted for age, gender, race (whites vs others), a history of hypertension, diagnostic cost group relative risk score (continuous) of patients, teaching versus nonteaching facility, physician versus nonphysician provider, number of PCP visits 1 year before, provider panel size and clustering at the level of the facility. For BP <140/90 mm Hg, results were also adjusted for proportion of days covered with antihypertensive medication. Analyses were further adjusted for clustering of patients at the facility level.
‡ Composite of hypertension control (BP <140/90 mm Hg), statin use, antiplatelet use, and diabetes control (A1c <7.0% in diabetics).
Comparison to other registries:

- National Cardiovascular Data Registry (NCDR) – PAD patients with antiplatelet use >80%
  - But 85% of those patients had concomitant CHD
- Danish registry – Patients with PAD alone 50% less likely to receive ASA or statin therapy compared with patients with CHD alone.
- Similar results from PARTNERS program and REACH registry
Discussion

- Previous reports have demonstrated deficiencies in physician knowledge and treatment of PAD as well as difference in treatment between PCPs, cardiologists, and vascular surgeons.

- Patients may associate CHD with higher likelihood of poor outcomes compared with PAD or ICVD.
Limitations

- Observational study and cannot account for residual confounding
- Patterns of primary care could be different outside the VA system
- Measures or smoking cessation could not be reliably ascertained from the data set
- Medication affordability was not evaluated and could affect medication adherence and risk factor control
- Some patients may receive PCP/medications outside of VA (but this should not have impacted between group comparisons)
- Inpatient ICD-9 codes used to identify some patients with CHD and inpatient treatment may have affected OMT and risk factor control in these patients
- Discontinuation of therapy by patients could not be ascertained from data set.
Proposed ways to improve

- Academic detailing
- Patient education