The Peripheral Arterial Disease Guideline: Evidence-Based Management of Patients With PAD

Core Curriculum Slide Set

A Collaborative Product Co-Developed by:
American College of Cardiology; American Heart Association;
American Association of Cardiovascular and Pulmonary Rehabilitation;
National Heart, Lung and Blood Institute; Peripheral Arterial Disease Coalition;
Society for Cardiovascular Angiography and Interventions;
Society of Interventional Radiology; Society for Vascular Nursing;
Society for Vascular Medicine and Biology; Society for Vascular Surgery;
TransAtlantic Inter-Society Consensus; and Vascular Disease Foundation.
The Peripheral Arterial Disease Task to be Accomplished Is Encompassed in the Title:

ACC/AHA Guidelines for the Management of Patients With Peripheral Arterial Disease:

_A Collaborative Report from the_
American Association for Vascular Surgery/Society for Vascular Surgery,
Society for Cardiovascular Angiography and Interventions,
Society of Interventional Radiology,
Society for Vascular Medicine and Biology, and
the ACC/AHA Task Force on Practice Guidelines.

_Also endorsed by the:_
American Association of Cardiovascular and Pulmonary Rehabilitation;
National Heart, Lung, and Blood Institute;
Society for Vascular Nursing;
TransAtlantic Inter-Society Consensus; and
The Vascular Disease Foundation.
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### Applying Classification of Recommendations and Level of Evidence

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<th>Class III</th>
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<td>Benefit &gt;&gt;&gt; Risk</td>
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<td>Benefit ≥ Risk</td>
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<td>Procedure/Treatment MAY BE CONSIDERED</td>
<td>Procedure/Treatment should NOT be performed/administered SINCENCE IT IS NOT HELPFUL AND MAY BE HARMFUL</td>
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- Class I: Benefit >>> Risk
  - Procedure/Treatment SHOULD be performed/administered
  - IT IS REASONABLE to perform procedure/administer treatment
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- Class IIa: Benefit >> Risk
  - Additional studies with focused objectives needed
  - IT IS REASONABLE to perform procedure/administer treatment
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- Class IIb: Benefit ≥ Risk
  - Additional studies with broad objectives needed; Additional registry data would be helpful
  - Procedure/Treatment MAY BE CONSIDERED
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- Class III: Risk ≥ Benefit
  - No additional studies needed
  - Procedure/Treatment should NOT be performed/administered SINCENCE IT IS NOT HELPFUL AND MAY BE HARMFUL
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  - Procedure/Treatment should NOT be performed/administered SINCENCE IT IS NOT HELPFUL AND MAY BE HARMFUL

- **should**
  - is recommended
  - is indicated
  - is useful/effective/beneficial

- **is reasonable**
  - can be useful/effective/beneficial
  - is probably recommended or indicated

- **may/might be considered**
  - may/might be reasonable usefulness/effectiveness is unknown /unclear/uncertain or not well established

- **is not recommended**
  - is not indicated
  - should not
  - is not useful/effective/beneficial
  - may be harmful
Applying Classification of Recommendations and Level of Evidence

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**Level A**  
Multiple (3-5) population risk strata evaluated  
General consistency of direction and magnitude of effect

**Level B**  
Limited (2-3) population risk strata evaluated

**Level C**  
Very limited (1-2) population risk strata evaluated
Why a PAD Guideline?

- To enhance the quality of patient care
- Increasing recognition of the importance of atherosclerotic lower extremity PAD:
  - High prevalence
  - High cardiovascular risk
  - Poor quality of life
- Improved ability to detect and treat renal artery disease
- Improved ability to detect and treat abdominal aortic aneurysm
- The evidence base has become increasingly robust, so that a data-driven care guideline is now possible
PAD Guideline:
The Target Audiences Are Diverse

- Primary care clinicians
  - Family practice
  - Internal medicine
  - PA, NP, nurse clinicians
- Cardiovascular/vascular medicine, vascular surgical, & interventional radiology trainees
- Vascular specialists

This is not intended to be a procedural guideline; it is intended to provide a guide to optimal lifelong PAD care.
PAD
Epidemiology
Prevalence of PAD

In a primary care population defined by age and common risk factors, the prevalence of PAD was approximately one in three patients.
Prevalence of PAD Increases With Age

- Rotterdam Study (ABI < 0.9)\(^1\)
- San Diego Study (PAD by noninvasive tests)\(^2\)

**ABI=ankle-brachial index**

Gender Differences in the Prevalence of PAD

Adapted from Diehm C. *Atherosclerosis*. 2004;172:95-105 with permission from Elsevier.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Women</th>
<th>Men</th>
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<tbody>
<tr>
<td>&lt;70</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>70-74</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>75-79</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>80-84</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>&gt;85</td>
<td>16</td>
<td>18</td>
</tr>
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</table>

6880 Consecutive Patients (61% Female) in 344 Primary Care Offices

Adapted from Diehm C. *Atherosclerosis*. 2004;172:95-105 with permission from Elsevier.
Ethnicity and PAD: 
The San Diego Population Study

NHW    Black   Hispanic  Asian

Fraction of Population With PAD (%)

NHW = Non-hispanic white.
Diabetes Increases the Risk of PAD

Impaired glucose tolerance was defined as oral glucose tolerance test value ≥140 mg/dL but <200 mg/dL.

*P<.05 vs. normal glucose tolerance.

CRP as Predictor of Incident PAD

CRP = C-reactive protein; hs-CRP = high-sensitivity C-reactive protein

Risk Factors for PAD

- Smoking
- Diabetes
- Hypertension
- Hypercholesterolemia
- Hyperhomocysteinemia
- C-Reactive Protein

Relative Risk

PARTNERS: Prevalence of PAD and Other CVD in Primary Care Practices

29% of Patients in a Target Population Were Diagnosed With PAD Using An Office-Based ABI

- 29% Patients diagnosed with PAD
- 44% PAD only
- 56% PAD and CVD

ABI=ankle-brachial index; CVD=cardiovascular disease.

Based on the epidemiologic evidence base, an “at risk” population for PAD can be objectively defined by:

- Age less than 50 years with diabetes, and one additional risk factor (e.g., smoking, dyslipidemia, hypertension, or hyperhomocysteinemia)
- Age 50 to 69 years and history of smoking or diabetes
- Age 70 years and older
- Leg symptoms with exertion (suggestive of claudication) or ischemic rest pain
- Abnormal lower extremity pulse examination
- Known atherosclerotic coronary, carotid, or renal artery disease
PAD
Prognosis
The Natural History of PAD

- Individuals with PAD are at increased risk for cardiovascular ischemic events due to concomitant CAD (fatal and non-fatal MI) and cerebrovascular disease (fatal and non-fatal stroke).

- Cardiovascular events are more frequent than ischemic limb events in any lower extremity PAD cohort, regardless of the clinical presentation.
Natural History of Atherosclerotic Lower Extremity PAD

PAD Population (50 years and older)

Initial clinical presentation

- Asymptomatic PAD: 20%-50%
- Atypical leg pain: 40%-50%
- Claudication: 10%-35%
- Critical limb ischemia: 1%-2%

Progressive functional impairment

1-year outcomes

- Alive w/ 2 limbs: 50%
- Amputation: 25%
- CV mortality: 25%

5-year outcomes

(to next slide)

For each of these PAD clinical syndromes:

- **Asymptomatic PAD** (20%-50%)
  - **Limb morbidity**
    - Stable claudication (70%-80%)
    - Worsening claudication (10%-20%)
  - **5-year outcomes**
- **Claudication** (10%-35%)
  - Critical limb ischemia (1%-2%)
  - Amputation (see CLI data)
- **Atypical leg pain** (40%-50%)
  - **CV morbidity & mortality**
    - Nonfatal CV event (MI or stroke) (20%)
    - Mortality (15%-30%)
      - CV causes (75%)
      - Non-CV causes (25%)

CLI=critical limb ischemia; CV=cardiovascular; MI=myocardial infarction

Contemporary PAD
Rates of Myocardial Infarction and Death

3649 subjects (average age 64 years) followed up for 7.2 years

Long-Term Survival in Patients With PAD


Normal subjects
Asymptomatic PAD
Symptomatic PAD
Severe symptomatic PAD
### Relative Risk of Death in Patients With PAD

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Relative Risk</th>
<th>95% CI</th>
</tr>
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<tbody>
<tr>
<td>All Causes</td>
<td>3.1</td>
<td>(1.9-4.9)</td>
</tr>
<tr>
<td>CVD</td>
<td>5.9</td>
<td>(3.0-6.6)</td>
</tr>
<tr>
<td>CHD</td>
<td>6.6</td>
<td>(2.9-14.9)</td>
</tr>
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CI = confidence interval; CHD = coronary heart disease; CVD = cardiovascular disease.

10-Year Natural History in Patients With Intermittent Claudication

Survival
MI
Intervention
Amputation

Time (years)
Patients (%)
0 1 2 3 4 5 6 7 8 9 10
0 10 20 30 40 50 60 70 80 90 100

Association Between ABI and All-Cause Mortality*

Age range=mid- to late-50s; ABI=ankle-brachial index; *Median duration of follow-up was 11.1 (0.1–12) years.

Adapted from O'Hare AM et al. Circulation. 2006;113:388-393.
Cardiovascular Risk Increases With Decreases in Ankle-Brachial Index

Framingham “High Risk” = 20% at 10 years
Every patient with PAD is at “very high risk”

*Fatal or nonfatal MI. ABI=ankle-brachial index; CHD=chronic heart failure

Baseline Physical Activity and Mortality in Persons With PAD

P-trend = 0.003

P = 0.02

P = 0.07

P = 0.61

Mortality According to ABI and Diabetes: Strong Heart Study


ABI = ankle-brachial index; IFG = impaired fasting glucose.
Critical Limb Ischemia (CLI)

Fate of Patients With CLI After Initial Treatment
Summary of 6-month outcomes from 19 studies

- Alive without amputation: 45%
- Alive with amputation: 35%
- Dead: 20%

Critical limb ischemia is defined as ischemic rest pain, nonhealing wounds, or gangrene.