Peripheral Arterial Disease is the Central Cardiovascular Public Health Mandate: 

Disparities in Treatment Outcomes for Minorities with Cardiovascular Disease

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What Is Peripheral Arterial Disease?

- Presence of a stenosis or occlusion in the aorta or arteries outside the heart, and usually to the lower extremities. Usually caused by atherosclerosis.

- PAD is associated with an increased risk of cardiovascular and cerebrovascular events, including death, MI, and stroke.

*PAD is anatomy. PAD is prognosis.*

Belch JJF et al. *Arch Intern Med.* 2003;163:884
Our feet carry us through life:

• From Neanderthal to homo erectus to homo sapiens
• Baby’s first steps
• We walk down the aisle to marry
• We avoid amputation & the wheelchair
A Tale of Two Cities

*It was the best of times, it was the worst of times …”*

- Life in London and Paris
- A story that describes social injustice
- Description of the differential lives of the "peers of the realm" vs the commoner.
- Prose helps us see reality and feel sympathy for tragic characters who live in tragic times.
The Facts of Life (and Death)

• PAD affects more than 9 million Americans
• PAD is one of the most prevalent, morbid, and mortal cardiovascular diseases
• The cost of PAD is as high (or likely higher) than any other cardiovascular disease
• Payers now obstruct access to the most accurate, safe, and cost-effective CV diagnostic test (the ankle-brachial index, or ABI).
• PAD is the most under-diagnosed and under-treated cardiovascular disease.
• PAD risk is highest in African-Americans.
• Nevertheless, the public is unaware of PAD. Knowledge is lowest for non-whites, lowest income, and lowest educational level.
Health Disparity #1:
Not all diseases are created equal
### Heart Disease: 2008

#### Heart Risk Factors

- Mr. Smith wonders if he is at risk for heart attack.
- He sees his physician, gets an ECG, blood cholesterol, stress test, EBCT (coronary calcium score), and perhaps an angiogram...
- Treatment is offered.

#### Heart Attack

- Ms. Anderson experiences 30 minutes of chest pain.
- She is taken to an ER, an ECG is done, and after helicopter transport to a tertiary care hospital a coronary angioplasty is done within 90 minutes.

#### Heart Failure

- Mr. Johnson feels short of breath with exercise.
- He obtains a heart failure diagnosis by echo, receives medication, a biventricular pacemaker, and returns to work. Heart transplant is discussed, but is not now required.
- Life is extended…
Vascular (Arterial) Disease: 2008

<table>
<thead>
<tr>
<th>Heart Risk Factors</th>
<th>Heart Attack</th>
<th>Heart Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mr. Smith wonders if he is at risk for leg pain or amputation. He sees his physician, who tells him he is “getting older”. No tests are performed, a cholesterol is not drawn nor treated. He is considered the “worried well”.</td>
<td>• Ms. Anderson experiences a non-healing foot ulcer for 30 days. She goes to an ER, no blood flow measurements are done. She is offered a topical salve. No referral is made.</td>
<td>• Mr. Johnson feels a sudden, severe pain in his abdomen or chest, and loses consciousness. He is brought to an emergency room, a CT scan is done, a general surgeon is called, and he dies of a ruptured aortic aneurysm or aortic dissection.</td>
</tr>
</tbody>
</table>
The differences in care standards are not their fault.

*The differences in care standards were not created by biology.*

*They were created by men and women.*
Health Disparity #2:
Not all diseases are equally morbid and mortal
Prevalence of PAD Increases with Age

PAD is present in 5-25% of the adult population.

Natural History of Atherosclerotic Lower Extremity PAD

For each of these PAD clinical syndromes

- **Asymptomatic PAD**
  - 20%-50%

- **Claudication**
  - 10%-35%

- **Atypical leg pain**
  - 40%-50%

5-year outcomes

- **Limb morbidity**
  - Stable claudication 70%-80%
  - Worsening claudication 10%-20%
  - Critical limb ischemia 1%-2%
  - Amputation (see CLI data)

- **CV morbidity & mortality**
  - Nonfatal CV event (MI or stroke) 20%
  - Mortality 15%-30%
  - CV causes 75%
  - Non-CV causes 25%

What are contemporary CV ischemic event rates?

n=68,129 patients in 5,580 sites in 44 countries; up to 15 patients/site (up to 20 in the US)
One-Year Cardiovascular Event Rates in Outpatients with Atherothrombosis (2006): PAD as the most morbid & mortal disease

The highest cardiovascular event rates and death occur in individuals with PAD... in every country...

... and in every city in the United States.
REACH Registry PAD Sample: 8,660 patients from 5,467 sites in 44 countries

North America
N=2,496

Latin America
N=263

Western Europe
N=3,600

Eastern Europe
N=877

Middle East
N=73

Asia (incl. Japan)
N=1,074

Australia
N=277

Up to 15 patients were enrolled at each/site (up to 20 in the US)

Results: Systemic CV Event Rates at Two Years

- **Asymptomatic (ABI <0.90) (n=670):**
  - Non-fatal MI (%): 0.97
  - CV death (%): 2.73
  - Non-fatal stroke (%): 5.06
  - MI/stroke/death (%): 8.76

- **Claudication (n=5,558):**
  - Non-fatal MI (%): 2.28
  - CV death (%): 3.41
  - Non-fatal stroke (%): 5.18
  - MI/stroke/death (%): 10.06

- **Prior lower extremity revascularization (n=4,252):**
  - Non-fatal MI (%): 2.61
  - CV death (%): 6.05
  - Non-fatal stroke (%): 6.05
  - MI/stroke/death (%): 10.18

- **Prior lower extremity amputation (n=1,153):**
  - Non-fatal MI (%): 3.30
  - CV death (%): 3.92
  - Non-fatal stroke (%): 11.01
  - MI/stroke/death (%): 15.38

* p<0.05
** p<0.0001

European Society of Cardiology - 2007
Relative Control of Cardiovascular RFs in Patients With PAD only or PAD + CAD

In 2006:

Patients with PAD only

- 0 RF control: 46.2%
- All RFs controlled: 28.6%

Patients with PAD + CAD

- 0 RF controlled: 25.2%
- All RF controlled: 51.4%

Individuals with PAD, c/w CAD, achieve only half of their risk reduction goals.

Risk Factor Control defined as:
Systolic BP <140 mmHg, diastolic BP <90 mmHg, glycemia <1.1 g/L,
total cholesterol <2.0 g/L, not smoking for >12 months
The Morbidity of PAD – Quality of Life: Population-Based Comparison to Other CVD

PARTNERS database: 6499 individuals from 350 primary care sites, with 82% of subjects providing evaluable HRQoL questionnaire data

Individuals with PAD, on average, feel worse than those with CAD.

CLI Incidence and Amputation Rates Represent a Superb Example of a Major CV Health Disparity

Health Disparity #3:
Risk is not shared equally in this nation
Ethnic-Specific Prevalence of PAD in the USA

- PAD prevalence increases with age.
- At ages > 60 years, and adjusted for risk factors, African Americans had PAD at rates that were approximately two to three times higher than non-Hispanic whites.
- PAD affects 7.2% of the U.S population aged 40 years and older in the USA in 2000.

Health Disparity #4 - Cost:

“Pay now or pay later”

or

“Why not just wait until PAD becomes an MI?”
How Are PAD Costs Accrued?

70-85% of individuals with PAD do not have recognized CAD

Atherosclerosis Risk Factors

Lower Extremity PAD

Loss of work

Medications, PTA, Vascular surgery

Outpatient Inpatient

Myocardial Infarction Stroke Death Amputation

A conservative accounting of cost
National Healthcare Costs of PAD in the USA Medicare Population

To put these numbers into perspective, the $3.87 billion cost for Medicare PAD-related care is comparable to the Medicare expenditures for:

- cardiac dysrhythmias ($2.7 billion)
- congestive heart failure ($3.9 billion) and
- cerebrovascular disease ($3.7 billion).

Medicare and Medicaid Statistical Supplement 2004, Table 27

The $4.37 Billion Medicare PAD Expenditure is a Major Underestimation of Real Costs

Why?

• The population under 65 years is largely excluded from these Medicare costs (e.g., the 57 year old diabetic who undergoes leg bypass or amputation).

• This calculation excludes the costs of heart attack and stroke, as these costs are misallocated to “coronary heart disease”. Of those with PAD who suffer an MI, 85% did not have any clinical evidence of CAD before they “received their diagnosis” in the ER or at death.

• The 6.8% of the elderly Medicare population who received some treatment for PAD in 2001 represent one-third of those known to have PAD. Most simply are not treated.
Health Disparity #5 - Knowledge:

“What you don’t know can kill you”

Does it matter what we tell the public?

or

Is it good public policy to invest in biomedical research and leave public education to a policy of:

“Don’t ask, don’t tell”?
The Peripheral Arterial Disease Guideline: Evidence-Based Management of Patients with PAD

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
The Vascular Disease Foundation.
The PAD Coalition

The Coalition includes 71 organizations that collectively represent more than 1,012,000 health care professionals and 500,000 consumers.

www.padcoalition.org
Tracking Women’s Awareness of Heart Disease
An American Heart Association National Study

Lori Mosca, MD, MPH, PhD; Anjanette Ferris, MD; Rosalind Fabummi, PhD; Rose Marie Robertson, MD

Background—Cardiovascular disease (CVD) is the leading cause of mortality in men and women in the United States, yet prior research has shown a lack of awareness of risk among women. The purpose of this study was to assess the contemporary awareness, knowledge, and perceptions related to CVD risk among American women and to evaluate trends since 1997, when the American Heart Association initiated a national campaign to improve awareness of CVD among women.

Methods and Results—A telephone survey of a nationally representative random sample of women was conducted in June and July 2003, with an oversampling of black and Hispanic women; results were compared with those of similar surveys in 2000 and 1997. The present survey included 1024 respondents age ≥ 25 years; 68% were white, 12% black, 12% Hispanic, and 8% other ethnicities. Awareness, knowledge, and perceptions about heart disease were evaluated by use of a standard interviewer-assisted questionnaire. A shift in awareness of heart disease as the leading killer of women has occurred since 1997. In 2003, 46% of respondents spontaneously identified heart disease as the leading cause of death in women, up from 30% in 1997 (P<0.05) and 34% in 2000 (P<0.05). In contrast, the percentage of women citing cancer as leading cause of death has significantly decreased. Black, Hispanic, and younger women (<45 years old) had lower awareness of heart disease as their leading cause of death than did white and older women. Nearly all women reported comfort in discussing prevention with healthcare providers, but only 38% of women reported that their doctors had ever discussed heart disease with them.

Conclusions—Awareness of CVD has increased, although a significant gap between perceived and actual risk of CVD remains. Educational interventions to improve awareness and knowledge are needed, particularly for minority and younger women. (Circulation. 2004;109:573-579.)

Key Words: cardiovascular diseases ■ prevention ■ risk factors ■ epidemiology ■ women
Gaps in Public Knowledge of Peripheral Arterial Disease

The First National PAD Public Awareness Survey

Alan T. Hirsch, MD; Timothy P. Murphy, MD; Marge B. Lovell, RN;
Gwen Twillman; Diane Treat-Jacobson, PhD, RN; Eileen M. Harwood, PhD; Emile R. Mohler III, MD;
Mark A. Creager, MD; Robert W. Hobson II, MD; Rose Marie Robertson, MD;
W. James Howard, MD; Paul Schroeder, MA; Michael H. Criqui, MD, MPH;
for the Peripheral Arterial Disease Coalition

Background—Lower-extremity peripheral arterial disease (PAD) is associated with decreased functional status, diminished quality of life, amputation, myocardial infarction, stroke, and death. Nevertheless, public knowledge of PAD as a morbid and mortal disease has not been previously assessed.

Methods and Results—We performed a cross-sectional, population-based telephone survey of a nationally representative sample of 2501 adults ≥50 years of age, with oversampling of blacks and Hispanics. The survey instrument measured the demographic, risk factor, and cardiovascular disease characteristics of the study population; prevalent leg symptoms; PAD awareness relative to atherosclerosis risk factors and other cardiovascular and noncardiovascular diseases; perceived causes of PAD; and perceived systemic and limb consequences of PAD. Respondents were 67.2 ± 12.6 years of age with a high prevalence of risk factors but only a modest burden of known coronary or cerebrovascular disease. Twenty-six percent of respondents expressed familiarity with PAD, a rate significantly lower than that for any other cardiovascular disease or atherosclerosis risk factor. Within the “PAD-aware” cohort, knowledge was poor. Half of these individuals were not aware that diabetes and smoking increase the risk for PAD; 1 in 4 knew that PAD is associated with increased risk of heart attack and stroke; and only 14% were aware that PAD could lead to amputation. All knowledge domains were lower in individuals with lower income and education levels.

Conclusions—The public is poorly informed about PAD, with major knowledge gaps regarding the definition of PAD, risk factors that lead to PAD, and associated limb symptoms and amputation risk. The public is not aware that PAD imposes a high short-term risk of heart attack, stroke, and death. For the national cardiovascular disease burden to be reduced, public PAD knowledge could be improved by national PAD public education programs designed to reduce critical knowledge gaps. (Circulation. 2007;116:2086-94)
P.A.D Public Awareness Survey Methods

- 10-minute telephone survey used a Random Digit Dialing (RDD) sampling procedure to draw a national probability sample.
- Survey administered to three samples:
  - U.S. sample of 2,251 adults 50+ years
  - U.S. minority over sample of 250 African-Americans and Hispanics 50+ years
  - National cross-section of 501 Canadians 50+ years
- Final data compared to 2006 U.S. Census population and weighted based on age and gender.
The Survey Population Demographics
*A Representative USA National Sample (1)*

<table>
<thead>
<tr>
<th>Total Sample, n (%)</th>
<th>2,501 (100)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,163 (46.5)</td>
</tr>
<tr>
<td>Female</td>
<td>1,338 (53.5)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>906 (36.2)</td>
</tr>
<tr>
<td>60-69</td>
<td>680 (27.2)</td>
</tr>
<tr>
<td>70-79</td>
<td>586 (23.4)</td>
</tr>
<tr>
<td>80+</td>
<td>329 (13.2)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1,872 (74.9)</td>
</tr>
<tr>
<td>Black</td>
<td>346 (13.8)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>161 (6.4)</td>
</tr>
<tr>
<td>Other</td>
<td>86 (3.4)</td>
</tr>
</tbody>
</table>

## The Survey Population Demographics

### A Representative USA National Sample (2)

<table>
<thead>
<tr>
<th></th>
<th>Total Sample, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,501 (100)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>≤ High School</td>
<td>1,137 (45.5)</td>
</tr>
<tr>
<td>&gt; High School</td>
<td>1,338 (53.5)</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; $55,000</td>
<td>1,495 (59.8)</td>
</tr>
<tr>
<td>≥ $55,000</td>
<td>638 (25.5)</td>
</tr>
</tbody>
</table>

# The Survey Population Demographics

## Risk Factors and CV Diseases

<table>
<thead>
<tr>
<th>Risk Factor or CVD</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High blood pressure</td>
<td>52.6</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>48.0</td>
</tr>
<tr>
<td>Diabetes</td>
<td>18.5</td>
</tr>
<tr>
<td>Smoking History</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>15.8</td>
</tr>
<tr>
<td>Past</td>
<td>33.3</td>
</tr>
<tr>
<td>Never</td>
<td>50.7</td>
</tr>
<tr>
<td>Chest pain or angina</td>
<td>19.1</td>
</tr>
<tr>
<td>Heart attack</td>
<td>8.6</td>
</tr>
<tr>
<td>Coronary bypass surgery or angioplasty</td>
<td>9.8</td>
</tr>
<tr>
<td>Stroke</td>
<td>5.5</td>
</tr>
<tr>
<td>Mini-stroke or TIA</td>
<td>7.0</td>
</tr>
<tr>
<td>Carotid artery surgery or stenting</td>
<td>3.6</td>
</tr>
<tr>
<td>PAD</td>
<td>1.0</td>
</tr>
</tbody>
</table>
PAD Symptoms

Do you currently have ___ ?

Percentage of respondents

Persistent or recurring pain in legs: 18%
Frequent pain in legs when walking: 16%
Frequent pain in legs when sitting: 11%
Frequent pain in legs when elevated: 8%
Wound or sore on foot that would not heal: 1%
Any of these: 26%

Key Findings
Three Out of Four Adults Surveyed Are Not Familiar with PAD

How familiar are you with PAD: very familiar, somewhat familiar, not too familiar or not at all familiar?

- PAD Aware (26%)
- Not Aware of PAD (74%)

“PAD Aware” defined by “somewhat” or “very familiar” responses

Diseases With A Much Lower Prevalence Are Much Better Known Than PAD

Disease Prevalence

Disease Awareness

1 Multiple Sclerosis: Hope Through Research, NINDS. NIH Publication No. 96-75. September 1996.
2 Amyotrophic Lateral Sclerosis Fact Sheet. NINDS. NIH Publication No. 00-916. April 2003.
3 Cystic Fibrosis Foundation Fact Sheet, 06/07
PAD Awareness by Age and Gender

How familiar are you with PAD: very familiar, somewhat familiar, not too familiar or not at all familiar?

PAD Awareness by Education and Income

How familiar are you with PAD:
very familiar, somewhat familiar, not too familiar or not at all familiar?

Perceived Consequences of PAD Among Those “PAD Aware”

Based on what you know or have heard, what can PAD lead to if not treated?

- **Stroke**: 28%
- **Heart attack**: 25%
- **Death**: 14%
- **Amputation**: 14%
- **Disability**: 7%
- **Other**: 6%
- **Blood clot**: 4%

Few Americans First Learn About PAD through Health Care Providers

Conclusions

• Few (less than one in four) Americans are aware of PAD.
• Those Americans at risk for PAD do not know its causes and thus cannot take steps to prevent it.
• Few Americans know that having PAD markedly increases one’s short-term risk for heart attack, stroke, amputation and death.
• Those who are aware of PAD rarely first learn about it from health care providers.
Conclusions

• PAD-related knowledge is far below that of other comparable or lower risk CVD and other illnesses.

• These findings reinforce the need for national educational efforts on PAD.

• *Health professionals, the media, the healthcare industry, and government agencies share a responsibility to work together to inform the public about this common cardiovascular disease that affects nearly every American family.*
Launched in February 2006:

Serves as a clearinghouse for P.A.D. educational resources:
- Clinical practice tools
- Patient education resources
- Professional meetings
The Peripheral Arterial Disease Coalition

Clinician Tool Kit

Developed with the leadership of the AHA:

This kit includes:
- Pocket version of the new intersocietal “P.A.D. Guidelines”
- Patient education booklets
- CD providing an overview of the diagnosis & treatment of PAD, with a “how to” video on performing the ankle-brachial index test.

Distribution:
- AHA has distributed 50,000 kits via direct mail to clinicians
- Additional copies are available through the Coalition’s website
The PAD Guideline: Diverse Platforms For Diverse Users

The Wall Chart is:

- Suitable for any office
- Provides key points of knowledge for patients
- An initial print run of 100,000 charts has been distributed to primary care & cardiovascular practices
Targeted advertising and media efforts to reach health professional publications are now building awareness of the clinical significance of PAD by providing free access to educational (dx and treatment) resources.

In the next five years, one in four of your patients with Peripheral Arterial Disease will suffer a heart attack, stroke, amputation, or death.

You can change this outcome with the latest prevention, detection, and treatment strategies.
The Peripheral Arterial Disease Coalition

Why is the Timing and “Teaming” Perfect?

The PAD Coalition Can Provide the Bridge

Public Awareness of Peripheral Arterial Disease

Individual “at risk” or with PAD seeks care (primary care)

Individual “at risk” or with PAD receives vascular care

Physician Awareness of Peripheral Arterial Disease
So, What Exactly Must Change?

- **Public awareness**: Recognize that claudication and CLI are ischemic symptoms that are equal, or of more predictive value, than angina or MI.

- **Public access to the PAD diagnosis (removal of outdated barriers to ABI use)**: Recognize that true cardiovascular risk reduction must entail more than a “myocyte protection plan”.

- **Re-establishment of a “knowledge-based” culture**:

  *If you are a man or woman of faith:*
  Use your compassion to extend your hand to those in need …

  *If you are a man or woman rationalist:*
  Apply your mind to create solutions to real world challenges…

Heart and mind aligned
A Tale of Two Cities: PAD and CAD

*It was the best of times, it was the worst of times …*

- Individuals with CAD now enjoy access to care, low mortality, limited disability, and social support.
- Individuals with PAD now suffer impediments to care, the highest mortality, worst disability, and enjoy negligible social support.
- This is a tale of social injustice.

"It is a far, far better thing that I do, than I have ever done; it is a far, far better rest that I go to than I have ever known."
Peripheral Arterial Disease is the Central Cardiovascular Public Health Mandate

Highest prevalence
Highest morbidity and mortality
Lowest public awareness and knowledge
Very high – and perhaps highest -- cost
Newest (least used) treatment guideline

This is the greatest opportunity for current clinicians, health policy leadership, industry, and government agencies to achieve a positive national health impact.
Thank You ...

A brighter day for people with peripheral arterial disease ...