Use of Risk Assessment Tools to Guide Decision-Making in the Primary Prevention of ASCVD

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About the Presenter

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DISCLOSURES

No potential conflicts related to this presentation
Pre-test Question:
A 10 year ASCVD risk assessment is recommended in all primary prevention patients prior to initiation of statin therapy.

A. True
B. False
Risk Assessment as a Guide to Primary Prevention

- Risk Assessment
- Tools to Guide Decision Making
Risk Assessment as a Guide to Primary Prevention

- Risk Assessment
- Tools to Guide Decision Making
“In 1961 with just two words, Bill (Kannel) helped to change our understanding of the underlying causes of heart disease and stroke, and with two words, the entire field of preventive cardiology was born.”

Daniel Levy
Current Framingham Heart Study Director

Wong N., Sperling L., Baum S. The ASPC: Our 30 Year Legacy, Clinical Cardiology, 2016
Concept of cardiovascular “risk factors”

Age, sex, hypertension, hyperlipidemia, smoking, diabetes, (family history), (obesity)

FIGURE 1. Risk of CHD according to elevated blood pressure (BP), elevated cholesterol, and left ventricular hypertrophy: Framingham cohort 6-year follow-up. Elevated BP = ≥160/95; elevated cholesterol = ≥260 mg/dl.

Framingham Heart Study: Kannel et al., 1961
Why Use Risk Scores?

1) Dr. Kannel noted risk functions provide an “economic and efficient method of identifying persons at high cardiovascular risk who need preventive treatment,” (AJC 1976)

2) The ACC Bethesda Conf. noted intensity of treatment should match a person’s risk (Califf RM, JACC 1996).

3) A physician’s “guesstimate” is only accurate 24% of the time (Pignone et al, BMC health Serv Res 2003).

4) Routine use of global risk scores leads to greater use of guideline-based therapy and modest improvements in intermediate outcomes with no harm identified (Sheridan et al. BMC Health Serv Res 2008).
Preventive cardiology efforts begin with assessment of cardiovascular disease risk

Recommendation- begin with global risk assessment using Pooled Cohort Equations to estimate 10-year ASCVD Risk
The ACC and the American Heart Association (AHA), in collaboration with the National Heart, Lung, and Blood Institute and other specialty societies, have released four guidelines focused on the assessment of cardiovascular risk, lifestyle modifications to reduce cardiovascular risk and management of elevated blood cholesterol and body weight in adults.

In order to support the implementation of these guidelines the ACC and AHA have jointly published a new mobile application (app).

The ASCVD Risk Estimator application helps health care providers and patients estimate 10-year and lifetime risks for atherosclerotic cardiovascular disease (ASCVD) using the Pooled Cohort Equations and lifetime risk prediction tools. The ASCVD Risk Estimator provides easy access to recommendations specific to calculated risk estimates. Additionally, the app includes readily accessible guideline reference information for both providers and patients related to therapy, monitoring, and lifestyle.

The app is available on both iTunes (iPhones, iPads) and Google Play (Galaxy, Nexus, other Android devices). Use the links below from your mobile device to download the app.

Available at www.cardiosouce.com or www.clincalc.com
ASCVD Risk Estimator

- 10 year ASCVD Risk
- For those 20-59 risk estimator provides lifetime risk estimate
- Intended to drive discussions of greater adherence to heart-healthy lifestyle
- Part of risk discussion
Lifetime Risk for CVD (Age 50) – LOE C

Adjusted Cumulative Incidence vs Attained Age

Men
- ≥2 Major RFs
- 1 Major RF
- ≥1 Elevated RF
- ≥1 Not Optimal RF
- Optimal RFs

Women
- ≥2 Major RFs
- 1 Major RF
- ≥1 Elevated RF
- ≥1 Not Optimal RF
- Optimal RFs

Lloyd-Jones, Circulation 2006
Receiver Operating Characteristic Curves and Disease Prediction
Comparison of Novel Risk Markers for Improvement in Cardiovascular Risk Assessment in Intermediate-Risk Individuals

Intermediate Risk MESA Subjects (n=1330)

C-statistics:

- FRS alone 0.623
- FRS+CAC 0.784 (p<0.001)
- FRS+CIMT 0.652 (p=0.01)
- FRS+FMD 0.639 (p=0.06)
- FRS+CRP 0.640 (p=0.03)
- FRS+FamHx 0.675 (p=0.001)
- FRS+ABI 0.650 (p=0.01)

Yeboah J et al, JAMA 2012
Cardiac CT for Detection of Subclinical Atherosclerosis and Reclassification of Risk

coronary calcification - specific sign of atherosclerosis
“...risk estimation is based on group averages...applied to individual patients in practice. This process is admittedly imperfect..”

2013 ACC / AHA Guidelines on the Assessment of CV Risk
Performance of Pooled Cohort Equations in Diverse Population Samples: Predictable

- High SES, engaged patients: Over-estimate Risk
- Low SES, HIV, Inflammatory Dz: Under-estimate Risk
- Well Calibrated: Broad US Clinical Population

Estimated 10-y ASCVD Risk

Clinician-Patient Discussion
The Detection Gap in CHD

“Despite available RA approaches substantial gap in detection of asymptomatic individuals who develop CHD”

Current risk scores… “emphasize classic risk factors…. only moderately accurate for prediction of short- and long-term risk of major events…”

Pasternak and Abrams et al. 34th Bethesda conf. JACC 2003; 41: 1855-1917
Predicting ASCVD Risk?


- Family history
- Metabolic syndrome
- Biomarkers
- Arterial imaging/function

Pooled 10 yr ASCVD Risk Equation

Select patients

All patients
Identification of the Metabolic Syndrome

- Abdominal obesity (waist circumference)
  - Men >40 in
  - Women >35 in
- Triglycerides >150 mg/dL
- HDL-cholesterol
  - Men <40 mg/dL
  - Women <50 mg/dL
- Blood pressure >130/85 mm Hg
- Fasting glucose >100 mg/dL
MetS. A greater emphasis on assessing nutritional quality and levels of physical activity, with a focus on filling the gap between public health approaches and implementation in clinical practice, will be needed. Care models will continue to incorporate ACOs, but uncertainty exists as to how the ACA will affect MetS care in the future. It is foreseen that health care will transition to a greater degree from the clinic to the community, improving access to care, and that there will be a broadening of stakeholders to include public health, community, and industry sectors. Screening and performance metrics will enhance implementation of new care models in the future. Finally, the TT affirmed a call to action to encourage ongoing partnerships, funding, and initiatives to improve the lives of people with or at risk for MetS.
Social Determinants of Health: Zip Code vs. Genetic Code?

- Health varies at a very LOCAL level
- Life expectancy in Atlanta
SES and CV Outcomes: Challenges & Interventions


Low SES
- Poor access to care and healthy foods
- Psychosocial factors
- Behavioral factors
- Environmental factors

Traditional CVD Risk Factors
- Hypertension
- Dyslipidemia
- Diabetes
- Smoking
- Obesity
- Poor diet
- Physical inactivity

Interventions
- Behavioral counseling (physical activity, smoking, alcohol)
- Community-based programs
- Health education
- Local and federal health policy

Interventions
- Guideline-based care
- Lifestyle modification
- Task shifting
Socio-economic determinants of vascular disease (Food Deserts)- Presence of “L & MIC” in HIC

Mohamed Kelli, H. et al. ACC 2016; Circ CV Qual Outcomes 2017;10

- Food desert: Locations with low food access and low income (USDA).
- 23.5 million U.S. residents live in food deserts.
- 1421 subjects residing in the Atlanta (MetaHealth, Pred Health studies)

Food deserts in the Atlanta metropolitan area (USDA map) 4
Spectrum / Lifecourse of Health

Acute CV Events

Stable CVD

Subclinical CVD

Promotion of CV Health

Optimal Window at 3-5 years

Adapted from Fuster V., JACC 2015; 66(4):482.
Risk Assessment as a Guide to Primary Prevention

• Risk Assessment
• Tools to Guide Decision Making
Guideline on the Management of Blood Cholesterol

• Writing committee consisted of medical experts including cardiologists, internists, interventional cardiologists, an NP, pharmacists, a PA, a pediatrician, a nephrologist and a lay/patient representative.

• Document reviewed by 21 official reviewers each nominated by the ACC, AHA, AAPA, ABC, ACPM, ADA, AGS, APhA, ASPC, NLA, and PCNA, as well as 27 individual content reviewers.

• Guideline Summary-  * ACC Guideline Hub (Guidelines Made Simple)
  121 pages
  72 Recommendations
  Class I  29
  Class II a  26
  Class II b  14
  Class III  3
  2 Value Based Recommendations
Case......
A 58 yo African American female wants your opinion on heart attack & stroke prevention

Moderately active, Asx. Has made moderate lifestyle changes for 6 mo.
BMI of 29    BP 138/ 78 mmHg
TC 210 , HDL 32 , TG 180 , LDL 152
No Hx of Tob or DM
Hx of preeclampsia and psoriasis
Fasting BG 110 (family Hx of premature CAD & DM)

Risk Assessment......?
Identifying those at increased risk…….
Understanding Risk

• Absolute Risk
• Relative Risk
• Lifetime Risk
AHA/ACC Special Report

Use of Risk Assessment Tools to Guide Decision-Making in the Primary Prevention of Atherosclerotic Cardiovascular Disease

Donald M. Lloyd-Jones, MD, ScM, FACC, FAHA; Lynne T. Braun, PhD, CNP, FAHA; Chiadi E. Ndumele, MD, PD, FAHA; Sidney C. Smith, Jr, MD, MACC, FAHA; Laurence S. Sperling, MD, FACC, FAHA; Salim S. Virani, MD, PhD, FACC, FAHA; Roger S. Blumenthal, MD, FACC, FAHA

Published Online Ahead of Print November 10, 2018 in Circulation and JACC
Refining Risk Estimates for Individual Patients

Estimate Absolute 10-year ASCVD Risk

- Low Risk: 0 - <5%
- Borderline Risk: 5% - <7.5%
- Intermediate Risk: 7.5% - <20%
- High Risk: ≥20%

Clinician-patient discussion considering risk-enhancing factors and net benefit of therapy

If uncertainty remains, consider CAC score and revise decision based on results

Lifestyle modification

Lifestyle and drug therapy
Refining Risk Estimates - “CPR”

- Calculate
- Personalize
- Reclassify

Donald Lloyd-Jones, ACC 2019
Her 10 yr ACC/ AHA ASCVD risk is 8.3% (optimal risk 2.5%)

Discussion & implementation of treatment recommendations?
Her Lifetime ACC/ AHA ASCVD risk is 39% (optimal risk 8%)

Impact discussion & treatment recommendations?
Risk Enhancing Factors?

Impact discussion & treatment recommendations?
## Refining Risk Estimates for Individual Patients

### Risk-Enhancing Factors for Clinician–Patient Risk Discussion

- **Family history of premature ASCVD**: (males, age <55 y; females, age <65 y)
- **Primary hypercholesterolemia** (LDL-C, 160-189 mg/dL [4.1- 4.8 mmol/L]; non-HDL-C 190-219 mg/dL [4.9-5.6 mmol/L])*
- **Metabolic syndrome** (increased waist circumference, elevated triglycerides (>175 mg/dL), elevated blood pressure, elevated glucose, and low HDL-C [<40 mg/dL in men; <50 in women mg/dL] are factors; tally of 3 makes the diagnosis)
- **Chronic kidney disease** (eGFR 15-59 mL/min/1.73 m² with or without albuminuria, not treated with dialysis or kidney transplantation)
- **Chronic inflammatory conditions** such as psoriasis, RA, or HIV/AIDS
- **History of premature menopause** (before age 40 y) and **history of pregnancy-associated conditions that increase later ASCVD risk** such as pre-eclampsia
- **High-risk race/ethnicities** (e.g. South Asian ancestry)
- **Lipid/biomarkers**: Associated with increased ASCVD risk
  - Persistently* elevated, primary hypertriglyceridemia (≥175 mg/dL);
  - If measured:
    - Elevated high-sensitivity C-reactive protein (≥2.0 mg/L)
    - Elevated Lp(a) A relative indication for its measurement is family history of premature ASCVD. An Lp(a) ≥ 50 mg/dL or ≥125 nmol/L constitutes a risk enhancing factor especially at higher levels of Lp(a)
    - Elevated apoB ≥130 mg/dL - A relative indication for its measurement would be triglyceride ≥ 200 mg/dL. A level ≥ 130 mg/dL corresponds to an LDL-C >160 mg/dL and constitutes a risk enhancing factor
    - **ABI (ABI) <0.9**
58 yo African American female

Moderately active, Asx. Has made moderate lifestyle changes for 6 mo.
BMI of 29    BP 138/78 mmHg
TC 210, HDL 32, TG 180, LDL 152
No Hx of Tob or DM
Hx of preeclampsia and psoriasis
Fasting BG 110 (family Hx of premature CAD & DM)
Risk Enhancing Factors?

Metabolic Syndrome
Family Hx of premature CAD
Hx of preeclampsia
psoriasis
Primary Prevention:
Assess ASCVD Risk in Each Age Group
Emphasize Adherence to Healthy Lifestyle

Age 0-19 y
Lifestyle to prevent or reduce ASCVD risk
Diagnosis of Familial Hypercholesterolemia → statin

Age 20-39 y
Estimate lifetime risk to encourage lifestyle to reduce ASCVD risk
Consider statin if family history of premature ASCVD and LDL-C ≥160 mg/dL (≥4.1 mmol/L)

Age 40-75 y and LDL-C ≥70-<190 mg/dL (≥1.8-<4.9 mmol/L)
without diabetes mellitus
10-year ASCVD risk percent begins risk discussion

LDL-C ≥190 mg/dL (≥4.9 mmol/L)
No risk assessment; High-intensity statin (Class I)

Diabetes mellitus and age 40-75 y
Moderate-intensity statin (Class I)

Diabetes mellitus and age 40-75 y
Risk assessment to consider high-intensity statin (Class IIa)

Age >75 y
Clinical assessment, Risk discussion

ASCVD Risk Enhancers:
- Family history of premature ASCVD
- Persistently elevated LDL-C ≥160 mg/dL (≥4.1 mmol/L)
- Chronic kidney disease
- Metabolic syndrome
- Conditions specific to women (e.g., preeclampsia, premature menopause)
- Inflammatory diseases (especially rheumatoid arthritis, psoriasis, HIV)
- Ethnicity (e.g., South Asian ancestry)

Lipid/Biomarkers:
- Persistently elevated triglycerides (≥175 mg/dL, ≥2.0 mmol/L)

In selected individuals if measured:
- hs-CRP ≥2.0 mg/L
- Lp(a) levels >50 mg/dL or >125 nmol/L
- apoB ≥130 mg/dL
- Ankle-brachial index (ABI) <0.9

Risk discussion:
Emphasize lifestyle to reduce risk factors (Class I)

Risk discussion:
If risk enhancers present then risk discussion regarding moderate-intensity statin therapy (Class IIb)

Risk discussion:
If risk estimate + risk enhancers favor statin, initiate moderate-intensity statin to reduce LDL-C by 30% - 49% (Class I)

Risk discussion:
Initiate statin to reduce LDL-C ≥50% (Class I)

If risk decision is uncertain:
Consider measuring CAC in selected adults:
CAC = zero (lowers risk; consider no statin, unless diabetes, family history of premature CHD, or cigarette smoking are present)
CAC = 1-99 favors statin (especially after age 55)
CAC = 100+ and/or ≥75th percentile, initiate statin therapy

American College of Cardiology
“Evidence-Based” Not “Evidence-Bound”
Three Key Dimensions

Scientific evidence
Patient preference
Clinical Judgment
Clinician Patient Risk Discussion
### Table 7. Checklist for Clinician–Patient Shared Decision-Making for Initiating Therapy

<table>
<thead>
<tr>
<th>Checklist Item</th>
<th>Recommendation</th>
</tr>
</thead>
</table>
| **ASCVD risk assessment**      | • Assign to statin treatment group; use ASCVD Risk Estimator Plus.*  
  o In lower-risk primary-prevention adults 40-75 y of age with LDL-C ≥70 mg/dL (≥1.8 mmol/L).  
  o Not needed in secondary prevention, in those with LDL-C ≥190 mg/dL (≥4.9 mmol/L), or in those 40-75 y of age with diabetes mellitus.  
• Assess other patient characteristics that influence risk. See Risk-Enhancing Factors (Section 4.4.1.3. and Table 6)  
• Assess CAC (Section 4.4.1.4.) if risk decision is uncertain and additional information is needed to clarify ASCVD risk.  
  o Use decision tools to explain risk (e.g., ASCVD Risk Estimator Plus,* Mayo Clinic Statin Choice Decision Aid). |
| **Lifestyle modifications**    | • Review lifestyle habits (e.g., diet, physical activity, weight or body mass index, and tobacco use).  
• Endorse a healthy lifestyle and provide relevant advice, materials, or referrals. (e.g., CardioSmart, AHA Life’s Simple 7, NLA Patient Tear Sheets, PCNA Clinicians’ Lifestyle Modification Toolbox, cardiac rehabilitation, dietitian, smoking cessation program). |
<table>
<thead>
<tr>
<th>Checklist Item</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential net clinical benefit of pharmacotherapy</td>
<td>• Recommend statins as first-line therapy.</td>
</tr>
<tr>
<td></td>
<td>• Consider the combination of statin and nonstatin therapy in selected patients.</td>
</tr>
<tr>
<td></td>
<td>• Discuss potential risk reduction from lipid-lowering therapy.</td>
</tr>
<tr>
<td></td>
<td>• Discuss the potential for adverse effects or drug–drug interactions.</td>
</tr>
</tbody>
</table>
Table 7 continued

<table>
<thead>
<tr>
<th>Checklist Item</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost considerations</td>
<td>• Discuss potential out-of-pocket cost of therapy to the patient (e.g., insurance plan coverage, tier level, copayment).</td>
</tr>
</tbody>
</table>
| Shared decision-making       | • Encourage the patient to verbalize what was heard (e.g., patient’s personal ASCVD risk, available options, and risks/benefits).  
• Invite the patient to ask questions, express values and preferences, and state ability to adhere to lifestyle changes and medications.  
• Refer patients to trustworthy materials to aid in their understanding of issues regarding risk decisions.  
• Collaborate with the patient to determine therapy and follow-up plan. |
Recent studies generate risk scores from whole genome sequence data

>6 million single nucleotide variants are incorporated into the score

<table>
<thead>
<tr>
<th>Test result</th>
<th>OR myocardial infarction</th>
<th>Frequency among individuals with early onset MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>FH diagnosed by DNA testing</td>
<td>3.8</td>
<td>1.7%</td>
</tr>
<tr>
<td>Top 5% polygenic risk score</td>
<td>3.7</td>
<td>17%</td>
</tr>
</tbody>
</table>

Individuals with high risk polygenic risk profiles have different cholesterol profiles than those with FH

Case……

58 yo African American female

Following a detailed clinician-patient risk discussion:

Shared decision to begin moderate intensity statin therapy

Plan for continued focus on lifestyle / behavioral risk and diabetes prevention
Post-Test Question:
A 10 year ASCVD risk assessment is recommended in all primary prevention patients prior to initiation of statin therapy.

A. True
B. False
Post-Test Question:
A 10 year ASCVD risk assessment is recommended in all primary prevention patients prior to initiation of statin therapy.

A. True
B. False

** In patients with LDL-C > 190, DM age 40-75 (recommend statin) and age > 75 (clinical assessment & risk discussion)
Risk Assessment as a Guide to Primary Prevention

• RA begins with population-based risk score
• Importance of
  – Clinician-patient risk discussion
  – Net clinical benefit
• Use of risk enhancing factors
• GLs are a starting point
• Need better understanding of precision medicine & population-based risk
Cardiovascular Prevention Center – Founded 1997

- Primary and secondary prevention clinics
- HeartWise Risk Reduction Program
- Optimal Living
- Women’s Heart Program
- Cardio-oncology
- Cardio-inflammatory
- Sports Cardiology
- Subclinical markers of atherosclerosis
- Screenings and Risk Factor management
- LDL apheresis
- Housestaff / fellow training programs
- Clinical and Translational Science Research
Thanks......