The ACC/AHA ASCVD Risk Estimator App and the EHR FHIR Integration Project

Ty J. Gluckman, MD, FACC, FAHA
Medical Director, Clinical Transformation
Providence Heart and Vascular Institute, Oregon Region

and

Associate Editor, Practice Guidelines and Clinical Documents, ACC.org

DISCLAIMER: The views and opinions expressed in this presentation are those of the author and do not necessarily represent official policy or position of HIMSS.
Disclosures

Nothing to disclose
Objectives

History of the ASCVD Risk Estimator App

Purpose of the ASCVD Risk Estimator App

Measuring our success

ASCVD risk estimator EHR integration

Making the tool work for care providers

Just the tip of the iceberg
It starts with having a problem that is improved by having a point of care tool which supports better clinical decision-making and/or improved patient outcomes.
The 2013 ACC/AHA Blood Cholesterol Guidelines identified the following groups as appropriate for statin therapy:

- Established atherosclerotic cardiovascular disease (ASCVD)
- Familial hypercholesterolemia (LDL-C >190 mg/dL)
- Diabetes mellitus and LDL-C of 70-189 mg/dL
- Primary prevention (no ASCVD, FH, or DM)

It was recommended that 10-year ASCVD risk be assessed in the latter two groups to determine either A) statin intensity or B) statin appropriateness.

Risk is based on gender, age, race, TC, HDL-C, systolic BP, treatment for hypertension, tobacco use, and presence of diabetes.
The “You’ve Gotta Be Kidding Me” Solution

So, We Made a Better Calculator

Companion tool to enable healthcare providers to estimate 10-year and lifetime risks for atherosclerotic cardiovascular disease (ASCVD)

And Then Asked, What Other Needs Could be Met by the App?

Based on the data entered (assuming no clinical ASCVD and LDL-C 70-189 mg/dL):

- Gender: Male
- Age: 58
- Race: White/Other
- Total Cholesterol: 222
- HDL-Cholesterol: 42
- Systolic Blood Pressure: 146
- Hypertension Treatment: No
- Diabetes: No
- Smoker: No

**Moderate to High-Intensity Statin Recommended**

Before initiating statin therapy, it is reasonable for clinicians and patients to engage in a discussion which considers the potential for ASCVD risk reduction benefits and for adverse effects, for drug-drug interactions, and patient preferences for treatment. (IIa C)

Adults 40 to 75 years of age with LDL-C 70 to 189 mg/dL with no diabetes and estimated 10-year ASCVD risk ≥7.5% should be treated with moderate to high-intensity statin therapy. (I A)

In individuals for whom after quantititative risk assessment a risk-based treatment decision is uncertain, additional factors may be considered to inform treatment decision making. These factors may include primary LDL-C ≥160 mg/dL or other evidence of genetic hyperlipidemias; family history of premature ASCVD with onset <55 years of age in a first degree male relative or <65 years of age in a first degree female relative; high-sensitivity C-reactive protein ≥2 mg/L, CAC score ≥300 Agatston units or ≥75 percentile for age, sex, and ethnicity, ankle-brachial index <0.9, or elevated lifetime risk of ASCVD. Additional factors may be identified in the future. (IIb C)

http://tools.acc.org/ASCVD-Risk-Estimator/
And Then Asked, What Other Clinician Needs Could be Met?

<table>
<thead>
<tr>
<th>Clinician References</th>
<th>Statin Safety Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding Cardiovascular Risk</td>
<td>Statin Selection</td>
</tr>
<tr>
<td>Lifestyle Recommendations</td>
<td>Statin Dosage</td>
</tr>
<tr>
<td>Groups that Benefit from Statin Therapy</td>
<td>Creatine Kinase (CK)</td>
</tr>
<tr>
<td>Blood Cholesterol Recommendation Summary</td>
<td>Muscle Symptoms</td>
</tr>
<tr>
<td>Recommendations for Initiation of Statin Therapy</td>
<td>Hepatic Function</td>
</tr>
<tr>
<td>Intensities of Statin Therapy</td>
<td>- Baseline measurement of hepatic transaminase levels (ALT) should be performed before initiating statin therapy. (I B)</td>
</tr>
<tr>
<td>Recommendations to Monitor Response to Statin Therapy</td>
<td>- During statin therapy, it is reasonable to measure hepatic function if symptoms suggesting hepatotoxicity arise (e.g., unusual fatigue or weakness, loss of appetite, abdominal pain, dark colored urine or yellowing of the skin or sclera). (IIa C)</td>
</tr>
<tr>
<td>Statin Safety Recommendations</td>
<td>Diabetes</td>
</tr>
<tr>
<td>External Links to Full Guidelines &amp; More Information</td>
<td>Age and Drug Regimen Consideration</td>
</tr>
</tbody>
</table>

- Lovastatin 20 mg
- Simvastatin 10 mg
And Then Asked, What Other Patient Needs Could be Met?

Patient References

- Understanding My Cardiovascular Risk
- Diet and Physical Activity Recommendations
- Weight Management Recommendations
- Blood Cholesterol Management Recommendations
- Groups that Benefit from Statin Therapy
- Common Cardiovascular Terms

Groups that Benefit from Statin Therapy Infographic

http://tools.acc.org/ASCVD-Risk-Estimator/
How Do We Measure the Success of an App?

281,260 app downloads*

Average Daily (M-F) Web Sessions = 2,661
Average Daily (M-F) App Sessions = 5,411
Average Daily (M-F) Total Sessions = 8,072

Total Web Sessions = 1.51 million
Total App Sessions = 3.58 million
Total Sessions = 5.09 million

The best medical app released in 2014

*Through December 2015

©HIMSS 2016
But, Where Are We Spending All of Our Time These Days?
Clinicians expend many hours documenting patient visits in their electronic health record (EHR) system. To access a clinical app, however, care providers often use a smart phone or tablet.

Integrating ACC clinical apps into electronic health record (EHR) systems will enhance current workflows and documentation by making these tools available to clinicians at the point of care.

Fast Healthcare Interoperability Resources (FHIR) Specification defines a standard that advances the capability of clinical apps by requesting specific patient data from the patient’s electronic chart to be inserted into the risk tool.
Fast Healthcare Interoperability Resources (FHIR)

- Application Programming Interface (API) for exchanging health data
- Draft standard describing data formats and elements (known as resources)
- Created by the Health Level Seven International (HL7) organization
- Uses a modern web-based suite of API technology
  - HTTP-based RESTful protocol, CSS, JSON, XML, Oauth
- Exposes discrete data elements as services
FHIR Integration with ACC Tools

1. send patient ID & URL where data can be accessed
2. request to access data for a specific patient
   data is sent back to requesting application
3. form is pre-populated and returned to requestor

clinician accessing patient records

ACC services and tools
ACC Calculators can be integrated with any FHIR vendors where `fhirServiceUrl` and `patientId` are provided to the below URL:


Publicly available FHIR servers to test are available at:


It’s important to remember that FHIR is a work in progress with non-uniform vendor implementation and query performance.
The ASCVD risk estimator app is currently integrated into Epic


Go to Epic and open the below link:

- [https://open.epic.com/launchpad/UnprotectedSmart#](https://open.epic.com/launchpad/UnprotectedSmart#)

Log in with one of the listed accounts

Select the test patient, George A Eros, as this patient has all of the required data

Launch the URL:

Epic's FHIR Proof of Concept—Opportunity to Test it Out

ASCVD Risk Estimator*

<table>
<thead>
<tr>
<th>10-Year ASCVD Risk</th>
<th>Lifetime ASCVD Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.9% calculated risk</td>
<td>69% calculated risk</td>
</tr>
<tr>
<td>1.9% risk with optimal risk factors**</td>
<td>5% risk with optimal risk factors</td>
</tr>
</tbody>
</table>

Gender
- Male
- Female

Age
- 49

Race
- White
- African American
- Other

HDL - Cholesterol (mg/dl)
- 60

Total Cholesterol (mg/dl)
- 170

Diabetes
- Yes
- No

Treatment for Hypertension
- Yes
- No

Systolic Blood Pressure
- 160

Smoker
- Yes
- No

*Intended for use if there is not ASCVD and the LDL cholesterol is <190 mg/dl.
**Optimal risk factors include: Total cholesterol of 170 mg/dl, HDL-cholesterol of 60 mg/dl, Systolic BP of 110 mm Hg. Not taking medications for hypertension, Not a diabetic, Not a smoker.
# Epic’s FHIR Proof of Concept—Opportunity to Test it Out

**ASCVD Risk Estimator**

All fields are required to compute ASCVD risk.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol (mg/dL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>HDL - Cholesterol (mg/dL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic Blood Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment for Hypertension</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>African American</td>
</tr>
<tr>
<td>Smoker</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

*Intended for use if there is not ASCVD and the LDL cholesterol is <190 mg/dl.*

**Optimal risk factors include: Total cholesterol of 170 mg/dl, HDL cholesterol of 50 mg/dl, Systolic BP of 110 mm Hg. Not taking medications for hypertension, Not a diabetic. Not a smoker**
But, It’s Got to Work For My Office’s Workflow

<table>
<thead>
<tr>
<th>Estimator</th>
<th>Clinicians</th>
<th>Patients</th>
<th>About</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCVD Risk Estimator*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All fields are required to compute ASCVD risk.

<table>
<thead>
<tr>
<th>Gender</th>
<th>M</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol (mg/dL)</td>
<td>130-3</td>
<td></td>
</tr>
<tr>
<td>HDL Cholesterol (mg/dL)</td>
<td>20-10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>20-79</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Race</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
</tr>
<tr>
<td>African</td>
</tr>
<tr>
<td>American</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Systolic Blood Pressure</th>
<th>90-20</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Treatment for Hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diabetes</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Smoker</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
</table>

*Intended for use if there is not ASCVD and the LDL-cholesterol is <190 mg/dL.
**Optimal risk factors include: Total cholesterol of 170 mg/dL, HDL-cholesterol of 50 mg/dL, Systolic BP of 110 mm Hg, Not taking medications for hypertension, Not a diabetic, Not a smoker.
Welcome to ACC's Statin Intolerance Tool

This tool should be used by clinicians to assess, treat, and manage patients with possible statin intolerance.

Although muscle symptoms may occur, true statin intolerance is uncommon. Given the benefits of statins in ASCVD risk reduction, clinicians should partner with the patient to gain a thorough symptom history and determine if he or she is truly statin intolerant. Walk through the steps of treating and managing a patient who reports muscle symptoms, including cycles of statin discontinuation and rechallenge to identify a tolerated statin and dose.

1. Evaluate

Patient has been rechallenged with original statin

Current Follow-Up
Did muscle symptoms return after rechallenge?
- Yes
- No

Recommendation

Next Steps
- Stop original statin.
- Wait for muscle symptoms to resolve
ACC’s Exciting FHIR Future

• Work with other EHR vendors to integrate the ASCVD risk estimator app

• Implement FHIR interfaces to other ACC tools and services:
  • Assessment of CHA$_2$DS$_2$-VASc and HAS-BLED scores in patients with nonvalvular atrial fibrillation (NVAF)
  • Risk of inpatient mortality in patients undergoing transaortic valve replacement (TAVR)

• Prototype FHIR integration with National Cardiovascular Data Registry risk scores
  • Examples include the CathPCI inpatient mortality, restenosis and bleeding risk scores