



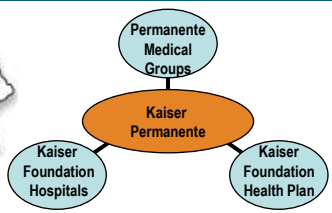
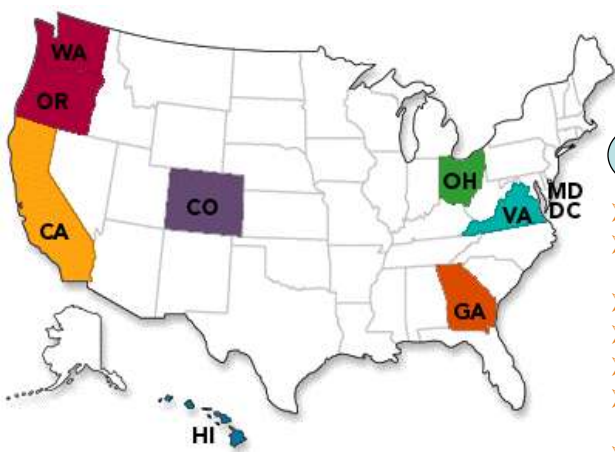
# Interactive Web Page for Embedding Guidance In the Kaiser Permanente Electronic Health Record

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## Kaiser Permanente: Largest Non-Profit Health Care Program in the United States



- Founded in 1945
- 8 regions in 9 states and District of Columbia
- 8.6 million members (as of 12/09)
- 15,129 physicians (as of 12/09)
- 164,098 employees (as of 12/09)
- KP Care Management Institute (CMI)
- KP National Guideline Program (NGP)

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## Overview

### ➤ Background:

- Guidelines must be implemented to impact health outcomes
- Guidance can be embedded in interactive web pages
- Linking interactive web pages to electronic health records (EHRs) has significant potential for impact
  - Automated individual-level data transfer
  - Meta-tagged links
    - Place Orders from a web page into an EHR

## Learning Objectives

### ➤ After this session, attendees will be able to:

- Describe elements of a guideline web page that can address the needs of clinical users at the point of care
- List three levels of potential interactivity for guideline web pages
- Explore the pros and cons of interactive web pages for embedding guidance in their own systems

**Lipid Treatment Goals for Secondary Prevention**

**As LDL-C treatment goal of < 100 mg/dL is recommended for reducing rates of coronary events in patients with established atherosclerotic disease.** Reducing LDL-C is the primary focus of treatment. Only after the LDL-C is at goal should attention be turned to managing triglycerides (TG) and HDL-C, except when TGs are  $\geq 200$  mg/dL. (See [Thyridy-Less<sup>®</sup> section, LDL-C](#))

**A more aggressive LDL-C goal of < 70 mg/dL is an option.** With the increasing use of more potent statins, there are now many randomized controlled trials where the treatment group has achieved LDL-C levels substantially below 100 mg/dL. Several have obtained levels below 70 mg/dL. In all cases, the lower LDL-C group had significantly lower atherosclerotic events. Most of these trials, however, were not designed to evaluate the LDL-C level obtained and it is therefore unknown whether the benefit was derived from the LDL-C reduction, the intensity of the statin, other factors, or a combination of these. The Guideline Development team therefore recommends the goal of LDL-C < 70 as an option. Many authorities, however, now recommend the < 70 mg/dL goal especially in patients at very high risk.

When to intensify treatment in people with an LDL-C < 100 mg/dL should be a shared decision with the patient, taking into consideration factors such as overall CVD risk, TG status, HDL-C, non-HDL cholesterol, medication tolerance, cost and patient preference.

**Choice of Drug - Primary and Secondary Prevention**

Before initiating drug treatment, rule out and, if present, correct any secondary causes of dyslipidemia such as poor glycemic control, hypothyroidism, renal or liver disease, or medications.

**Because of its proven effectiveness in event reduction, safety and cost, atorvastatin is the preferred first line statin for both primary and secondary prevention patients.** Comparisons of individual lipid lowering strategies (statins, niacin, fibrate and niacin or, placebo, have shown that statins are the most effective for reducing CVD events. Given that all statins appear to be efficacious at lowering LDL-C, the choice of statin should be based on both cost and evidence of direct benefit on important health outcomes (e.g., CVD morbidity and mortality). The initiation doses in [Table 2](#) were chosen to achieve target LDL-C, up to the maximum dose of 80 mg daily. See [Medication Information](#) section for dosing and safety recommendations for the use of lipid modifying drugs.

**Lipid Management in Acute Coronary Syndromes**

**In patients with acute coronary syndromes:**

- Statins are recommended regardless of baseline LDL-C.
- If baseline lipid values are desired, a 12-hour fasting lipid panel is recommended as soon as possible, but definitely within 48 hours after hospital admission.
- If a fasting lipid panel is not possible a non-fasting lipid panel is recommended as soon as possible after hospital discharge.
- Repeat the lipid panel two months after hospital discharge.

The intent of acute events (see lower LDL-C levels for up to 2 to 3 months). Evidence suggests that people with ACS should receive immediate aggressive statin lipid lowering treatment. Emphasize the importance of lifestyle modifications and adherence to lipid lowering medications.

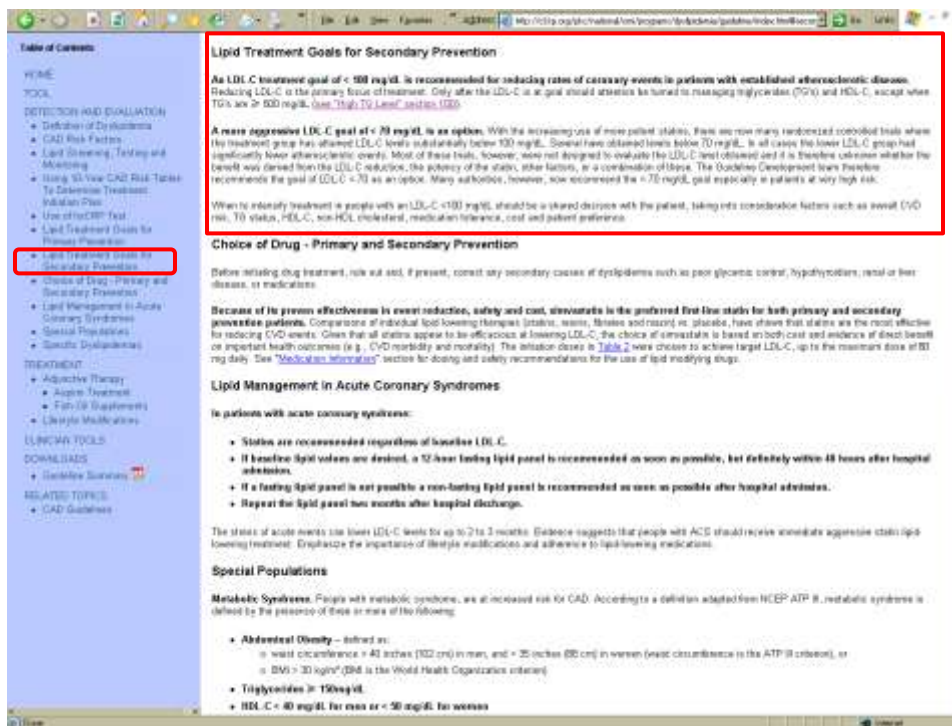
**Special Populations**

**Metabolic Syndrome.** People with metabolic syndrome are at increased risk for CAD. According to a definition adapted from NCEP ATP III, metabolic syndrome is defined by the presence of three or more of the following:

- **Abdominal Obesity** – defined as:
  - waist circumference  $\geq 40$  inches (102 cm) in men, and  $\geq 35$  inches (89 cm) in women (waist circumference is the ATP III criterion), or
  - BMI  $\geq 30$  kg/m<sup>2</sup> (BMI is the World Health Organization's criterion)
- **Triglycerides**  $\geq 150$  mg/dL
- **HDL-C**  $< 40$  mg/dL for men or  $< 50$  mg/dL for women

**Dyslipidemia Guideline Web Portal Structured to Support Clinical Decision-Making**

People with	Baseline LDL-C (mg-dL)	Lifestyle Modifications are Recommended in ALL Patients Initiate Treatment with a Daily Evening Dose of:	Target LDL-C (mg-dL)	See Corresponding Sections
<b>Acute Coronary Syndrome</b>	Any	Simvastatin 40 mg	< 100 OPTIONAL < 70*	<ul style="list-style-type: none"> <li>• <a href="#">Lipid Treatment Goals for Secondary Prevention</a></li> </ul>
<b>Clinical Risk Categories</b> <ul style="list-style-type: none"> <li>• CAD or ischemic Stroke/TIA</li> <li>• Diabetes Mellitus (DM) age <math>\geq 40</math></li> <li>• AAA or PAD</li> <li>• Carotid artery stenosis (<math>&gt; 50\%</math>)</li> </ul>	$\geq 160$	Simvastatin 80 mg	<b>Treatment Targets</b> *Percent in <a href="#">Acute Coronary</a>	<ul style="list-style-type: none"> <li>• <a href="#">Lipid Treatment Goals for Secondary Prevention</a></li> <li>• <a href="#">Lipid Treatment Goals for Primary Prevention</a></li> <li>• <a href="#">Choice of Drug - Primary and Secondary Prevention</a></li> <li>• <a href="#">Statins: Benefit Age 40 or Older</a></li> </ul>
	$< 160$	Simvastatin 40 mg		
<ul style="list-style-type: none"> <li>• Framingham 10-year risk/ <math>\geq 20\%</math></li> <li>• DM age <math>&lt; 40</math> WITH <math>\geq 1</math> risk factor*</li> </ul>	$\geq 160$	Simvastatin 80 mg	<b>Pop-up Definitions</b> *It is <b>OPTIONAL</b> to initiate statin therapy in DM and women $\geq 40$ years old with noCAD. $\geq 2$ mg on 2 days, treat with simvastatin 40 mg. The decision is based on cost effectiveness of using statin to select patients for non-lipid lowering treatment is not known.	<ul style="list-style-type: none"> <li>• <a href="#">Use of HDL-C Test</a></li> <li>• <a href="#">Lipid Treatment Goals for Primary Prevention</a></li> <li>• <a href="#">Choice of Drug - Primary and Secondary Prevention</a></li> <li>• <a href="#">Statins: Benefit Age 40 or Older</a></li> </ul>
	100 – 159	Simvastatin 40 mg		
	$< 100$	Simvastatin 40 mg <b>OPTIONAL</b> (for Framingham 10-year risk $> 20\%$ )		
<ul style="list-style-type: none"> <li>• DM age <math>&lt; 40</math> WITHOUT risk factors*</li> </ul>	$\geq 160$	Simvastatin 80 mg	<ul style="list-style-type: none"> <li>• <a href="#">Lipid Treatment Goals for Primary Prevention</a></li> <li>• <a href="#">Choice of Drug - Primary and Secondary Prevention</a></li> <li>• <a href="#">Diabetes Mellitus Age 20 or Under</a></li> </ul>	
	120 – 159	Simvastatin 40 mg		
	$< 100$	Simvastatin 40 mg <b>OPTIONAL</b>		
<ul style="list-style-type: none"> <li>• CKD Stage 4 or 5 (GFR <math>&lt; 30</math> mL/min/1.73 m<sup>2</sup> or)</li> </ul>	$\geq 160$	Simvastatin 20 mg	<ul style="list-style-type: none"> <li>• <a href="#">Chronic Kidney Disease</a></li> </ul>	
	$\geq 100$	Simvastatin 20 mg <b>OPTIONAL</b>		
	120 – 219	Simvastatin 40 mg		
<ul style="list-style-type: none"> <li>• Framingham 10-year risk/ 10–22%</li> </ul>	$\geq 220$	Simvastatin 80 mg	<ul style="list-style-type: none"> <li>• <a href="#">Using 10-Year CAD Risk Tables To Determine Treatment Intensity Plan</a></li> <li>• <a href="#">Use of HDL-C Test</a></li> <li>• <a href="#">Lipid Treatment Goals for Primary Prevention</a></li> <li>• <a href="#">Choice of Drug - Primary and Secondary Prevention</a></li> </ul>	
	120 – 219	Simvastatin 40 mg		
	$< 130$	statin <b>OPTIONAL*</b>		
<ul style="list-style-type: none"> <li>• Framingham 10-year risk/ <math>&lt; 10\%</math></li> </ul>	$\geq 220$	Simvastatin 80 mg	<ul style="list-style-type: none"> <li>• <a href="#">Using 10-Year CAD Risk Tables To Determine Treatment Intensity Plan</a></li> <li>• <a href="#">Use of HDL-C Test</a></li> <li>• <a href="#">Lipid Treatment Goals for Primary Prevention</a></li> </ul>	
	120 – 219	Simvastatin 40 mg		
	100 – 199	WITH <a href="#">File of prescriptive CAD*</a> and Simvastatin 40 mg		



## Logic-Encoded Web Pages, Data Transfer, & Meta-Tagged Links

- **Logic-encoded web pages**
  - Require manual data entry
  - Return individualized recommendations
- **Automated individual-level data transfer**
  - Pass detailed information from EHR to web servers
- **Meta-tagged links**
  - Pass Orders from web servers to EHR
  - “Actionable” recommendations & graphic/text algorithms
- **Combination allows individualized, actionable guidance, seamlessly embedded in an EHR**

**10-Year CAD** **User Enters Data**

Age:  years    **Arteriosclerotic CVD**  Yes  No

Gender:  Female  Male    **Diabetes**  Yes  No

Total Cholesterol:  mg/dL    **Microalbuminuria**  Yes  No

HDL Cholesterol:  mg/dL    **Duration of DM ≥ 10 yrs**  Yes  No

Systolic Blood Pressure:  mmHg    **LDL Cholesterol**  mg/dL

Diastolic Blood Pressure:  mmHg    **On Statins**  Yes  No

On BP Medications:  Yes  No    **GHx < 30**  Yes  No

Smoker:  Yes  No    **PHx of Premature CAD**  Yes  No

**10-Year CAD** **Data Passed from EHR to Web Server**

Age:  years     Yes  No

Gender:  Female  Male     Yes  No

Total Cholesterol:  mg/dL     Yes  No

HDL Cholesterol:  mg/dL     Yes  No

Systolic Blood Pressure:  mmHg     Yes  No

Diastolic Blood Pressure:  mmHg     Yes  No

On BP Medications:  Yes  No     Yes  No

Smoker:  Yes  No     Yes  No

**10-Year CAD Risk is 16%.**

Aspirin 81 mg daily Optional (10-Year CAD Risk: 10-20%)

LDL-C Goal < 130

Simvastatin 40mg daily Recommended

**Individualized Recommendations Returned**

**Corresponding Sections in Guidelines**

- Classical Risk, Primary and Secondary Prevention
- Low Intensity Goals for Primary Prevention
- Use of statin drug
- Guidelines for CAD: Risk Stratification, Determination Treatment Intensity, Plan

**Hyperlinks to Details**

**Main 55 - 59 Years Old**

Data provided is recommended for all people with CAD, Diabetes Mellitus (age 40 or older), Ischemic Stroke/TIA, AAA, PAD, or Elevated Aortic Stenosis (> 60%), regardless of baseline LDL-C, unless for all people with baseline LDL-C ≥ 190 mg/dL, regardless of risk factors



**Data Passed from EHR to Web Server**

**10-Year CAD Risk is 16%**  
Aspirin 81 mg daily Optional (10-Year CAD Risk: 10-20%)  
LDL-C Goal < 130  
Simvastatin 40mg daily Recommended

**Individualized Recommendations Returned**

**Meta-Tagged Links Return Orders in EHR**

**Combination of:**  
• Logic-Encoded Web Pages  
• Automated Individual-Level Data Transfer  
• Meta-Tagged Links  
Allows individualized, actionable guidance, seamlessly embedded in an EHR

## Interactive Web Page Conclusions

- Interactive web pages can support the needs of clinical users at the point of care
  - Present actionable guidance
  - Provide entry point into larger guideline document
- Data transfer from an EHR to a web page can automate the presentation of guidance
- Functionality exists to turn interactive web pages into individualized, actionable guidance in an EHR
- Decision support logic can be encoded in the web pages, rather than built into EHR tools

# Embedding Guidance in the Kaiser Permanente EHR



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